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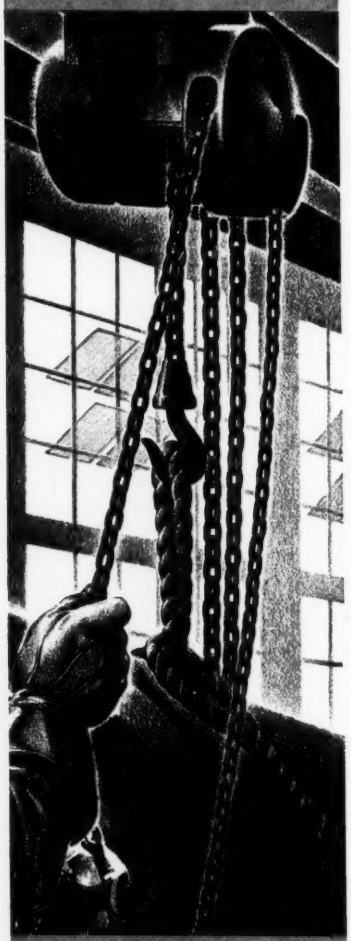

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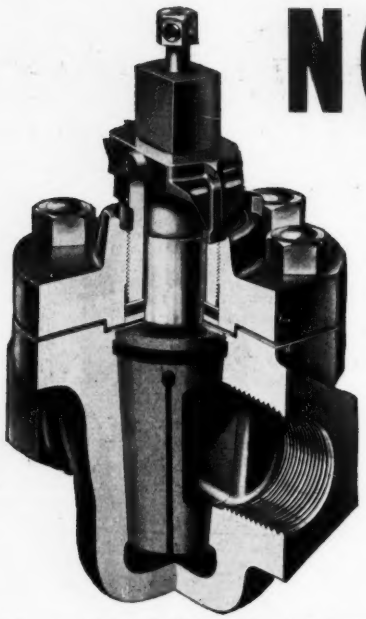

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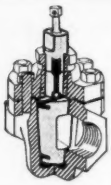
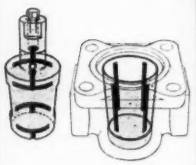
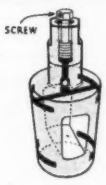


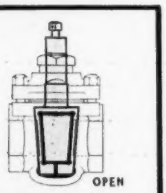
1 Cut-away view of 3" Nordstrom Valve, to reveal lubricated plug in position.



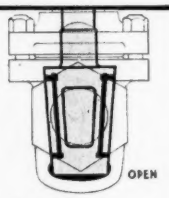
2 Simplified view, same valve, with plug lifted out, showing lubricant grooves in plug and body.



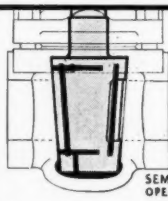
3 Hydraulic pressure forces plastic lubricant through plug channels to outer, upper grooves by turning screw.



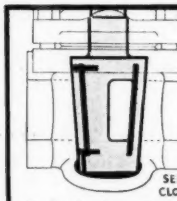
4 Grooves in plug connect with grooves in body, making circuit for lubricant to reach bottom plug grooves and maintain pressure.



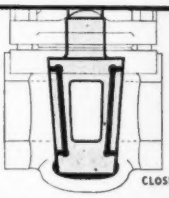
5 Port side of valve (valve open) with plug in same position as figure 4. Note the unbroken pressure circuit.



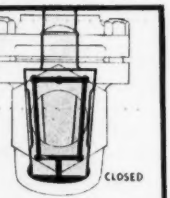
6 When plug turns to shut off valve, lubricant pressure is cut off from vertical groove in body **exposed** to plug port.



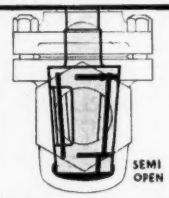
7 As plug turns, the lubricant pressure circuit is unbroken because vertical groove **unexposed** to plug port connects top and bottom grooves.



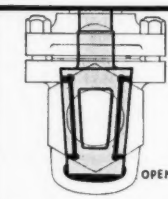
8 Plug is now at 90° turn, completely shutting off valve. Vertical groove exposed to plug port re-joins horizontal grooves of plug



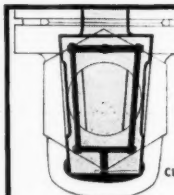
9 View of valve, port side Pressure lubricant grooves form a continuous seal around the closed valve port.



10 Reversing the operation to turn on valve Vertical body groove exposed to plug port is relieved of pressure because the plug grooves break the circuit.

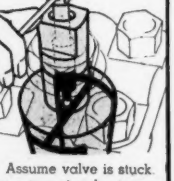


11 Valve in full open position presents unrestricted passage of line contents, but lubricant seal protects surface of plug

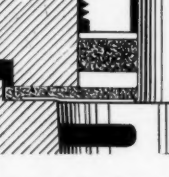


12 When valve is closed, ring of pressure lubricant effectively seals the entire port of the valve

13 Under plug, a lubricant chamber forms hydraulic lifting means, to lift tapered plug from its seat.



14 Assume valve is stuck. Operator simply turns screw. This increases pressure on lubricant through grooves and to bottom chamber which lifts plug sufficiently to free it.



15 No long stuffing box needed. Packing is frictionless, unexposed. Positive seal formed by metal diaphragm.

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AMERICAN
DYESTUFF REPORTER

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The Testing of Textiles for WATERPROOFNESS

WALTER M. SCOTT, Ph.D.*

THE treatment of textiles to render their surfaces more repellent towards water and to prevent or retard complete penetration by water, is not by any means a new development. In a contemporary German article[1], translated by the writer for publication in the July 25, 1938 issue of this magazine, reference is made to a publication on the subject of the waterproofing of fabrics, which appeared over 100 years ago.

For many years the desired effect was obtained by precipitating insoluble aluminum soaps on or in the fibers, or by treating them with solutions of paraffin wax in an organic solvent with subsequent removal of the solvent by evaporation. However, during the past ten years there have been developed stable wax emulsions which have greatly improved the technique of waterproofing textiles so that at the present time it is possible to provide all types of fabrics with varying degrees of resistance to water.

During the earlier period when the methods of waterproofing textiles were few and simple, there was no great demand for other than a few simple tests to evaluate roughly the effectiveness of the treatment. It usually sufficed to pour water into a shallow trough of the fabric and note whether the surface was wetted immediately or how much time elapsed before wetting of the surface was apparent. Sometimes a record was made of the length of time in which the fabric held the water before the first drop went through.

With the advent of the improved waterproofing technique it has become desirable to make reasonably accurate determinations of the degrees of waterproofness in various competing fabrics and to check rather closely the uniformity of successive treatments of different lots of the same fabric. Numerous tests have been proposed for this purpose but none of them have as yet proved to be universally acceptable, nor have the procedures been sufficiently standardized so that satisfactory agreement on results can be obtained between different testing laboratories.

The purpose of this article is to discuss a number of the methods used for quantitatively evaluating the waterproofness of textiles, and to point out which methods seem to offer the best possibilities for adoption as standard. The methods will be discussed in two main groups as follows: (1) those methods which measure the resistance of fabrics to penetration by water and (2) those methods which measure the water-repellency of fabrics in terms of their resistance to the absorption of water.

*Gustavus J. Esselen, Inc., Boston, Mass.

RESISTANCE TO PENETRATION BY WATER

Water Pressure Tests

The simplest and earliest test of this type was the trough test which was described above. This test does not come into serious consideration for quantitative work because of the difficulty of standardizing the conditions sufficiently to give uniformly reproducible results.

The funnel test was a later modification of the trough test. A procedure for testing the water resistance of canvas by this method was described by Veitch and Jarrell[2]. Twelve inch squares of fabric were soaked for 24 hours in water at 70-80° F. crumpling 4 or 5 times by hand during this period, then dried in the oven at 115° F. for 24 hours. The soaking and drying were repeated once more, then each sample was smoothed out and placed on a piece of paper toweling of the same size. The two pieces were folded together in the form of a filter and placed in a 6 inch glass funnel having an angle of 60°. The funnel was then filled with water at 70-80° F. to a depth of 4 inches and the water level was kept constant during the period of test. Records were made of the time before the paper began to wet, the time required for the paper to become entirely wet, the time before the first drop passed through the funnel into a graduated cylinder below, and the quantity of water in the cylinder after 1, 3, 6 and 24 hours. The investigators reported reasonable agreement between duplicate determinations on the same sample but it is doubtful whether satisfactory duplication could be obtained by different operatives working in different laboratories. Furthermore, the method appears to be too long and cumbersome to receive very general acceptance.

The box test[3] was developed by the Committee on Waterproofness of Fabrics of the A.A.T.C.C. A box was constructed with one open side over which the cloth to be tested could be clamped. The inside dimensions of the opening were 4¼ x 20½ inches. Provision was made

for rapidly filling the box with water to the full depth of 20½ inches or to any other desired level and an arrangement was provided for collecting the water which passed through the cloth. Thus it was possible to determine the minimum pressure of water required to produce leakage in the cloth after definite intervals of time, and the total amount of water passing through the cloth in various periods of time. This method was only recommended for heavy fabrics and it is further handicapped for general use because of the large sample required.

The hydrostatic pressure test has been described by a number of investigators but probably the most commonly used procedure is the one described in the Year Book of the A.A.T.C.C.[4]. A sample of the fabric is clamped down under a vertical well which is connected with a hydrostatic pressure reservoir graduated in centimeters. Water is admitted to the reservoir and the level is raised at the rate of one centimeter per second until the first drop of water appears through the fabric. The result is reported in centimeters of hydrostatic pressure. It is also possible to conduct a time test at any particular water level and to measure the amount of water passing through the fabric. Materials which show a hydrostatic pressure resistance of 17 centimeters are classified as having satisfactory shower resistance. If their water-pressure resistance reaches 50 centimeters they are classified as having satisfactory rain resistance, and with a resistance to 50 centimeters of water pressure for one hour they are classified as waterproof.

This hydrostatic pressure test has been found to be quite satisfactory for medium and heavy-weight fabrics with a tight weave although it is usually necessary to test a number of samples of the same fabric in order to reduce to a minimum the possibility of errors caused by slight imperfections in the weave. It is not so suitable for light-weight fabrics, particularly those with an open weave.

Check tests were recently made by two different laboratories on duplicate samples of untreated and showerproofed cotton gabardine. The results were as follows:

Laboratory No. 1

Untreated fabric: 21, 18, 20, 21; average 20 cm. water pressure

Treated fabric: 23, 21, 23, 23; average 22.5 cm. water pressure

Laboratory No. 2

Untreated fabric: 33, 26, 20, 21, 18, 17; av. 23 cm. water pressure.

Treated fabric: 26, 28, 27, 29, 28, 25, 23; ave. 27 cm. water pressure

It will be seen that the differences between the untreated and treated fabric were very slight in both cases and that one laboratory actually obtained a higher average water resistance for the untreated fabric than the other laboratory did for the same fabric after showerproofing. And yet a definite distinction between the untreated and treated samples was found in some of the waterproofness tests which will be described later.

On the other hand it has recently been reported[5] that on a flat rayon material this method of test was capable of distinguishing between applications of increasing concentrations of a waterproofing agent. For example, with a ¼ per cent concentration of the waterproofing agent the fabric resisted water pressure up to 8 cm.; with a ½ per cent concentration, up to 10 cm.; with a ¾ per cent concentration, up to 14 cm.; and with a 1 per cent concentration, up to 18 cm.

Wenzel[6] described a special modification of the hydrostatic pressure test in which the water pressure was increased at a much slower rate for light-weight silk and rayon fabrics. He used rates of 1.5 to 2.5 cm. per minute, instead of the 60 cm. per minute recommended by the A.A.T.C.C. It was also found that the tendency of the water to penetrate first at the clamped edge of the fabric could be minimized by pressing rings of waterproof adhesive tape to the upper surface of the test sample before clamping it in the apparatus. The agreement is parallel determinations reported by Wenzel was in general quite good but the calculation of the results was somewhat involved because of the necessity of making allowances for the bulge in the fabric due to the pressure of the water. It is doubtful whether a satisfactory agreement could be obtained between two different laboratories in parallel tests by this procedure.

Water Drop Tests

The general procedure followed by these tests is to allow water to drop from an orifice at a uniform rate onto the surface of the test fabric which is usually inclined at an angle of 45°, and to record the number of drops which fall before the water penetrates to the under side of the fabric. In order to obtain uniformity of results it is necessary to carefully control the size and rate of fall of the drops as well as the height from which they fall on the fabric. Moreover the drops should always land on the same spot and suitable provision should be made for detecting the first penetration of the water.

An apparatus has been developed by Dr. Kern[7] which satisfies these requirements quite well. The size of the drops is kept constant by the use of a stalagmometer and an even rate of fall is maintained by keeping a uniform head of water with the aid of an overflow reservoir. The stalagmometer is clamped to the same stand as the inclined plate which holds the sample and at a definite height above it. The wetting through of the fabric is determined by the completion of an electric circuit rather than by direct observation.

Check tests were made in one laboratory on an apparatus of this type, using samples of the untreated and showerproofed cotton gabardine mentioned above. Each drop from the stalagmometer weighed 0.0975 gm. and the drops fell at a rate of 10 drops every 7 seconds for a distance of 12 inches before hitting the fabric. The following results were reported:

The untreated fabric wet through after (1) 112 drops and (2) 110 drops of water.

The treated fabric wet through after (1) 440 drops, (2) 1245 drops and (3) 1350 drops of water.

The low results in the first test on the treated fabric may have been due to an imperfection in the weave. One or more abnormally low results of this sort often occur in a set of tests and it is usually advisable to exclude them in arriving at an average result. At any rate, the water-drop method of test distinguished clearly between the treated and untreated samples and appeared to be more suitable for this type of fabric than the hydrostatic pressure test described above.

Lindenmaier[5] used the water-drop test to measure the effect of increasing concentrations of a waterproofing agent on a cotton gabardine. When treated with a one-quarter per cent solution of the agent, 160 drops were required to wet through the cloth; with a one-half per cent solution 227 drops were required; with a three-quarters per cent solution, 284 drops were required; and with a 1 per cent solution, 410 drops were required.

RESISTANCE TO THE ABSORPTION OF WATER

Spray Tests

One form of spray test was described by Cook and Zaparanick[8]. A small spray-head was connected with a constant level water reservoir by means of rubber tubing. The spray-head was clamped in a horizontal position about 15 inches from the fabric sample which was 6 inches square and attached loosely by wire hooks to a horizontal frame. The height of the spray head was adjusted so that the spray hit the fabric squarely. The sample to be tested was weighed, placed in position on the frame and the spray was turned on for one minute. The sample was then removed quickly from the hooks, given a sharp shake once in the warp and once in the filling direction, then passed gently over a smooth knife-edge in each direction and weighed. The percentage increase in weight was calculated and used as a measure of the water-repellency of the fabric.

It was claimed that the above method gave highly consistent results in check tests. However, it is doubtful whether the conditions could be so exactly specified that satisfactory agreement could be obtained in different laboratories. For purposes of general standardization it seems better to allow the spray to fall vertically and to hold the sample at an angle of 45° to the spray. The size and number of the openings in the spray head, the rate of flow of the water and the height of the fall should be exactly specified.

One laboratory used this modified procedure in making check tests on samples of the untreated and showerproofed cotton gabardine mentioned above. A 6 inch square of the fabric was held at the angle of 45° to the spray which fell vertically from a height of 4 feet. The spray was regulated to a rate of 250 c.c. of water per minute and the sample was exposed to the spray for one minute. It was then removed from the holder and shaken sharply twice in the warp and twice in the filling direction. With a steel die, a 4 inch square was stamped out of the center of the spot hit by the spray and quickly weighed. It was then allowed to dry in the air and reweighed. The following percentages of moisture absorption were reported:

Untreated gabardine—(1) 95 per cent, (2) 91 per cent, (average) 93 per cent.

Treated gabardine—(1) 57 per cent, (2) 52 per cent, (average) 55 per cent.

Apparently this method of test distinguished as clearly between the treated and the untreated samples as the water-drop test. Both of these tests were superior to the hydrostatic pressure test for this type of fabric. The moisture-absorption test appears to be the least likely to give sharply divergent results due to some imperfection in the weave. However, a careful standardization of the procedure for removing the water clinging to the surface of the fabric is desirable, and care should be taken to avoid variations in the results due to differences in the relative humidity of the atmosphere.

Water Immersion Tests

Stenzinger[1] described an apparatus designed by Becker which eliminated most of the objections that had been raised against previous tests based upon the immersion of fabrics in water. It was felt that the chief reason for the lack of reproducibility in the earlier tests was that the test fabric was held stationary in the water and thus continued to entrain a certain amount of air which prevented a uniform wetting out of the fibers by the water.

Becker provided for a uniformly reproducible motion of the test specimen in the water. The fabric of yarn of known weight is stretched on a horizontal reel, the under part of which can be immersed in a bath of water. With the rotation of the reel the fabric moves at an even rate into and out of the water. The details of the test will be found in the translation of Stenzinger's article which appeared in the July 25, 1938 issue of this journal.

After a definite period of immersion, the reel is lifted out of the water and whirled at a fast rate to get rid of the water clinging to the surface of the fibers. The test sample is removed from the reel, shaken a definite number of times and weighed. The water-repellency of the sample is evaluated on the basis of the percentage increase in weight, just as in the spray tests previously described.

The accuracy of this immersion test appears to be fully as good as that provided by the spray test. In a series of tests on a wool gabardine, the differences between the maximum and minimum results of parallel tests on the same samples were never more than 5 per cent above or below the average. On yarns the agreement between duplicate tests was still better.

Trotman[9] used a modification of this method to measure the waterproofness of knitted woolen fabrics. Test specimens about 6 inches square were conditioned to constant weight in an atmosphere of 65 per cent relative humidity at 65° F. They were then immersed in cold water and stirred for 10 minutes, care being taken to keep the samples below the surface of the water for the entire period. Each sample was then squeezed lightly, centrifuged for 3 minutes and weighed.

A special centrifuge was constructed for these tests. It

consisted of a perforated metal gauze cylinder, 4 inches in diameter and 8 inches in length, which was mounted on a horizontal axle capable of being rotated at a speed of approximately 1400 revolutions per minute. The test samples were laid singly on the outside of the cylinder and secured to it by four rubber bands. The ends of the cylinder were open to allow free access for the current of air produced by the rotation. The time of 3 minutes for the centrifuging was selected after a series of experiments on an untreated knitted fabric. It was noted that the rate of loss of water from the samples decreased rapidly after the first 3 minutes which indicated that most of the surface water was removed within this period.

Trotman found that the maximum deviation between the results of any series of parallel tests on the same sample was 1 per cent. This indicated a high degree of accuracy for the procedure described above. By it he was able to obtain clear cut distinctions between the waterproofing effects of a large number of metallic soaps and various waxes applied in the form of solutions and emulsions.

Measurement of Contact Angles

Wenzel[10] pointed out that water repellency in textile fabrics corresponded to adhesion tension in capillary tubes. He stated that the most that any waterproofing process can do toward preventing penetration of water through the openings of a fabric is to give the thread surfaces a negative adhesion tension as great as the surface tension of the wetting liquid. The measurement of water repellency, then, hinges upon the measurement of adhesion tensions, which in turn resolves itself into the measurement of contact angles.

The tilting plate method of measuring contact angles was found to be capable of application to a wide variety of surfaces and of suitable accuracy for the purpose in hand. The procedure was described in great detail and results were given of a large number of contact angle measurements of metallic soaps, waxes, gums and other materials. This method of evaluating water repellency appears to be the most scientific one which has been developed up to the present time, because it deals with the fundamental principles underlying the problem. However, the procedure is not particularly well adapted for routine measurements in the usual mill laboratory and the apparatus is of a special type which would be costly to install.

SUMMARY

In reviewing the present situation in the textile industry with respect to the waterproofing of fabrics, it appears that three types of water resistance are required, depending upon the type of fabric and the use to which it was expected to be put. These types will be briefly discussed together with the methods of test which, based upon the results reported in this article, seem most suitable for defining each type.

1. *Strong resistance to water under some pressure.*—This is the type of resistance which is required of heavy tightly-woven fabrics, such as duck and canvas, which are likely to be used for tents, awnings, etc. It can be quite satisfactorily measured and defined by the hydrostatic pressure test developed by the A.A.T.C.C. In standardizing this test, precautions should be taken to prevent the untimely appearance of drops through the fabric near the circle of contact with the clamp, and those results which differ greatly from the general average because of imperfections in the weave should be excluded from consideration.

2. *Moderate resistance to penetration by falling water such as rain.*—This is the type of resistance which is required of medium-weight fabrics, such as overcoatings, suitings, shower curtains, etc. It can be measured and defined by a falling drop test such as the one developed by Dr. Kern. In standardizing the test, provision should be made for accurately controlling the size and frequency of the drops and precautions should be taken to insure that successive drops land on the same spot. The falling drop test should not be applied to light, loosely-woven fabrics because with these it has been demonstrated that entirely erroneous results may be obtained.

3. *Resistance to actual wetting by water.*—This is the type of resistance which is required of light-weight fabrics, such as women's dress fabrics of silk, rayon or cotton. It can be most satisfactorily measured and defined by either a spray test or a water immersion test such as the one developed by Becker. In standardizing these tests, provision should be made for definitely specifying the volume and fineness of the spray in the one case, and the speed of movement of the sample through the water in the other case. Both tests require the adoption of a satisfactory method for the uniform removal of the water clinging to the surface of the fibers if satisfactory agreement is to be obtained between determinations made by different operatives in different laboratories.

The measurement of the absorption of water by textiles appears to be the most universally applicable of all the methods for testing waterproofness. Satisfactorily agreeing results can be obtained with medium-and heavy-weight as well as with light-weight fabrics. However, there is some doubt whether the resistance of textiles to the absorption of water can be used in all cases as a measure of their resistance to penetration by water. At the present time, special committees of the American Association of Textile Chemists Colorists and of the American Society for Testing Materials are actively studying methods of test for the water resistance of textiles. It is anticipated that standard procedures will be evolved and specified in such exact terms that duplication of results may be obtained in entirely independent laboratories.

References

[1]Stenzinger, T., Monatschr. Textil-Ind. *50*, 15-19 (February, 1935).
[2]Veitch and Jarrell, Ind. Eng. Chem. *12*, 26-30 (1920).
[3]Year Book, American Association Textile Chemists and Colorists, 1936, p. 190. Reprinted from earlier editions.
[4]Ibid. p. 188. Reprinted from earlier editions.
[5]Lindenmaier, R., American Dyestuff Reporter, *27*, 288 (1938).
[6]Wenzel, R. N., American Dyestuff Reporter, *25*, 598-601 (1936).
[7]Kern, R., U. S. Patent 2,012,762, Aug. 27th, 1935.
[8]Cook & Zaparanick, American Dyestuff Reporter, *26*, 323-5 (1937).
[9]Trotman, S. R., Chem. & Ind. *57*, 56-60 (1938).
[10]Wenzel, R. N., American Dyestuff Reporter, *25*, 505-14 (1936).

Physical and Chemical
Textile Testing-XI

JOHN H. SKINKLE*

PART II—CHEMICAL TESTING

(Continued from August 22, 1938 issue)

Chapter 11—Organic Extraneous Matter (Continued)

SIZING AND FINISHING MATERIALS

Sizing materials are materials added to a yarn for the purpose of holding down the loose fibers, holding the twist in place, stiffening, and strengthening the yarn before weaving. Finishing materials are materials added to the cloth after weaving for the purpose of improving the appearance or handle, increasing the stiffness or resilience, and sometimes to increase the weight or opacity. Yarns are generally sized by means of starch, to which an antiseptic may have been added; crepe yarns may have their large amount of twist held in place by a coating of gelatine. Finishing materials are much greater in number and include the following groups and specific materials:

A. Adhesives.
   1. Starches—corn, potato, wheat, sago, tapioca.
   2. Dextrins—usually corn dextrin.
   3. Gums—tragacanth, arabic, carob (tragasol).
   4. Glue, gelatine, casein, or albumen.
   5. Agar, Irish moss, Iceland moss, alginates.

B. Weighting.
   1. Epsom salts or Glauber salts.
   2. China clay, talc, or gypsum.
   3. Sugars—cane sugar, glucose.

C. Softeners and lubricants.
   1. Glycerol or glycols.
   2. Oils or waxes.
   3. Soaps, sulfonated oils, or sulfated alcohols.

D. Deliquescents.
   1. Glycerol or glycols.
   2. Magnesium, calcium, or zinc chlorides.

E. Antiseptics.
   1. Zinc chloride, sodium silicofluoride, boric acid, copper sulfate.
   2. Salicylic acid, turpentine, phenols, cresols.

F. Crease resisting materials.
   1. Casein hardened by formaldehyde.
   2. Casein and latex mixtures.
   3. Synthetic resins.
      a. Phenol-formaldehyde condensates.
      b. Urea-formaldehyde condensates.
      c. Acrylic ester polymers.
      d. Alkyd or glycerol-phthallic anhydride condensates.
      e. Vinyl chloride-vinyl acetate co-polymers.

G. Permanent finishes.
   1. Cellulose ethers.
   2. Ethyl cellulose.

Since the sizing materials are also included as finishing materials, it is obvious that any analytical methods which apply to finishing materials will also apply to sizing materials, therefore we will discuss only finishing materials.

For convenience in discussion, we may divide the various kinds of finish into the following groups:

1. Pure finish—this depends wholly upon mechanical treatment and not upon the addition of any finishing material.

2. Coated fabric—this is the addition of a visible coating on the surface of the cloth of wax or linseed oil for a waterproof cloth; rubber for a water and air tight cloth; or collodion for an artificial leather. These types of material are obvious in their composition and method of analysis.

3. Crease-proof finish—this depends upon the application of one of the materials under (F) above; of these, the urea-formaldehyde synthetic resin is the most common at the present time. At least 8 per cent of the resin is necessary to obtain any appreciable crease-resistance and about 12 per cent is the usual amount used.

4. Permanent finish—this depends upon the deposition on the cloth of some material which will not wash off in laundering. The compounds most often used for this still quite new type of finish are cellulose ethers; 3½ to 5 per cent of cellulose ether will give a linen-like appearance, while 6 to 8 per cent will give a distinct stiffening effect. The cellulose ether is applied from an alkaline solution and is coagulated by dilute acid or concentrated salt solutions. Varying amounts of mineral fillers (B2 above) may be incorporated in the finish.

5. Weighting without appreciable change in appearance—this requires the addition of soluble salts or sugars (B1 or B3 above) together with a small amount of a protective colloid such as dextrin or gum (A2, A3, A4, or A5 above) to prevent crystallization of the weighting material.

6. Various starch finishes as follows:

a. If improved appearance with no loss in pliability is desired, starch (A1) and a softener (C) are used.

b. If stiffening alone is require, starch or dextrin (A1 or A2) is used alone.

c. If the cloth is to be made dense and opaque by filling up the spaces between the yarns, a starch (A1) together

*Lowell Textile Institute.

with a binder of dextrin or gum (A2, A3, A4, or A5), a softener (C), and a mineral weighting (B2) might be used.

Any of the starch finishes may also have an antiseptic (E) added to prevent mildew or bacterial damage; zinc chloride is the most common of these antiseptics.

According to chemical composition, we may classify the finishing materials as follows:

I. Substances removed by previous extraction with ether (or carbon tetrachloride) and alcohol.
   a. Oils and waxes.
   b. Soaps, sulfonated oils, sulfated alcohols.
   c. Glycerol and glycols.
   d. Salicylic acid, turpentine, phenol, cresols.

II. Carbohydrates and derivatives (all water soluble except [a]).
   a. Cellulose derivatives—cellulose ethers, ethyl cellulose.
   b. Starches and flours.
   c. Dextrins.
   d. Gums—tragacanth, arabic, carob.
   e. Agar, Irish moss, Iceland moss, alginates.
   f. Sugars—cane sugar, glucose.

III. Proteins (water soluble unless after-treated).
   a. Glue or gelatine.
   b. Casein.
   c. Albumen.

IV. Polymerized resins (insoluble in water).
   a. Latex (rubber).
   b. Duprene (synthetic rubber).
   c. Phenol-formaldehyde condensate.
   d. Urea-formaldehyde condensates.
   e. Acrylic ester polymers.
   f. Glycerol-phthallic anhydride condensates.
   g. Vinyl chloride-vinyl acetate co-polmers.

V. Inorganic substances.
   a. Soluble salts—$MgSO_4$, Na_2SO_4, $ZnCl_2$, $MgCl_2$ $CaCl_2$.
   b. Insoluble mineral matter—China clay, talc, gypsum.

The qualitative tests for specific finishing materials are not entirely satisfactory due to the chemical similarity of many of the substances used. A sample of the material may be ashed and the ash tested as in Chapter 10 for the inorganic constituents given in Group V above, or a water extract may be tested for the soluble salts (Va). Zinc chloride is much used in small amounts as an antiseptic, so a special test will be given for it.

If the specimen is previously given an extraction with ether (or carbon tetrachloride) and then an alcohol extraction, the oils and waxes may be separately identified (Group Ia) and the soaps, etc. (Group Ib) may be determined as in the previous section. Glycerol will also be found in the alcohol extract and may be best identified by the formation of glyceryl dibenzoate: the alcohol extract is cooled and filtered, evaporated to about 2 cc., and shaken with 20 cc. of warm dilute hydrochloric acid. The fatty matter is filtered off (or extracted with ether) and a slight excess of sodium carbonate and a few drops of 10 per cent sodium hydroxide are added to precipitate zinc and magnesium. The solution is filtered, neutralized with hydrochloric acid, and evaporated to 5 cc.; it is then shaken with 1 cc. of benzoyl chloride. 5 cc. of 10 per cent sodium hydroxide, and one drop of Methyl Red indicator solution. As soon as the precipitated glyceryl benzoate turns red, more sodium hydroxide is added until the odor of benzoyl chloride disappears. The somewhat oily product is filtered off, washed with water, dissolved by pouring 2 cc. of boiling alcohol through the filter, and allowed to crystallize. The melting point of the needles of glyceryl dibenzoate is 72-73° C.

The phenols and cresols may be tested for by boiling a sample of the textile material in dilute sodium hydroxide, then acidifying the solution. A little dilute ferric chloride will give characteristic colors with the various phenols and cresols as follows:

Phenol, m-cresol, tricresol	= violet
o-Cresol	= blue, changing to green
p-Cresol	= blue

A finish which is insoluble in water but dissolves in hot sodium hydroxide is probably a cellulose ether or ethyl cellulose finish.

A burning test is often helpful: on burning a textile sample the characteristic odor of burning rubber indicates Latex or Duprene; the odor of burning hair (protein) indicates glue, gelatine, casein, or albumen. An odor of formaldehyde would indicate phenol-formaldehyde or urea-formaldehyde resin.

Spotting the cloth with a dilute (0.1 per cent) iodine solution will show the presence of starch (blue) or dextrin (red to brown). Spotting with hot Millon's reagent will show the presence of protein—glue, gelatine, casein, or albumen. Millon's reagent is prepared by dissolving 1 cc. of mercury in 10 cc. of concentrated nitric acid, and then adding 10 cc. of water; the reagent should not be kept over a month; a red color with Millon's reagent indicates the presence of protein.

Casein may be tested for by boiling a small piece of the sample in water which has been made slightly acid with sulfuric acid; 5 cc. of the acid extract is then placed in a test tube, cooled, and 1 drop of 3 per cent formaldehyde is added. In another test tube is placed 2 cc. of concentrated sulfuric acid and 1 drop of 10 per cent ferric chloride solution. The water solution is flowed gently onto the top of the sulfuric acid without mixing with it. A violet ring at the junction of the liquids indicates casein.

Urea-formaldehyde resin, by far the most common of the synthetic anti-crease resins in use now, may be tested for by extracting the cloth with warm one-half per cent hydrochloric acid and adding to the extract a few crystals of phloroglucinol; on neutralizing with sodium hydroxide, a deep red color develops if urea-formaldehyde resin is present.

A spot test for zinc, sensitive to 0.25 per cent uses the two solutions following:

A. 1.0 gram of diphenylamine, 2 cc. of glacial acetic

acid, 18 cc. of water, 80 cc. of 95 per cent ethyl alcohol.

B. 0.5 per cent solution of potassium ferricyanide in water. One drop of (A) is placed on the cloth, followed by one drop of (B). In the presence of zinc a violet-black to green coloration is obtained with a violet ring around the drop. Iron gives a blue-green ring instead of violet.

Dextrin may be tested for in the presence of starch by soaking in cold water, followed by testing in the water extract with dilute iodine.

The remaining possible constituents should be tested for in a hot water extract of the cloth. The cloth is boiled in water for some time and the extract is then concentrated by evaporation, after which the following tests may be performed:

1. Starch and dextrin may be tested for here if not already tested for (Iodine reagent).
2. Proteins may be tested for if not already determined (Millon's reagent).
3. Soluble salts may be tested for.
4. Phenols, cresols, etc., may be tested for.
5. Soaps, etc., may be determined here if no preliminary extraction has been made.
6. Glycerol and glycols may be tested for by evaporating down some of the hot water extract after the addition of potassium bisulfate, followed by ignition of the residue. If glycerol is present, the characteristic odor of acrolein will be obtained; if ethylene or di-ethylene glycol is present, the odor of acetaldehyde will be obtained.
7. Sugars are tested for by Fehling's Solution. Solution A contains 69.28 grams of crystalline copper sulfate per liter; Solution B contains 346 grams of Rochelle salts (sodium potassium tartrate) and 100 grams of sodium hydroxide per liter; equal volumes of Solutions A and B are mixed just before use. A portion of the hot water extract is evaporated almost to dryness on a water bath and a portion of the concentrated solution is warmed with mixed Fehling's Solution. A red or yellow precipitate indicates glucose. Another portion of the concentrated solution is made acid with dilute sulfuric acid and boiled for 10 minutes, after which it is neutralized with sodium hydroxide and tested with Fehling's Solution. A red or yellow precipitate (in the absence of glucose, above) indicates the presence of cane sugar.
8. The gums, the mosses, and albumen (but not starch, dextrin, glue, or gelatine) are precipitated by basic lead acetate. The reagent is prepared from 30 grams of lead acetate, 10 grams of lead oxide (litharge), and 5 cc. of water, stirred on a water bath until the solution is white, then 100 cc. of water is stirred in; the reagent is then allowed to settle and is filtered.

The above group tests and specific tests are usually sufficient to identify the finishing materials present. Additional tests may be found in the literature if a more detailed knowledge of the constituents present is required. In general it is safer to carry out tests on known samples of the gums, mosses, and gelatines along with the unknown sample if positive identification is required.

For the quantitative determination of the total sizing or finishing materials (after extraction with the proper solvents) we have four methods available:

1. The alkali-acid or scouring method.
2. The acid-alkali method.
3. The enzyme or malting method.
4. The ammonium persulfate method.

The scouring method is as follows: a 5 gram sample is dried and weighed and is then treated for 1 hour at 80° C. with 200 cc. of 1 per cent sodium hydroxide, after which it is well rinsed and wrung out in hot water. It is then heated for 1 hour at 80° C. in 200 cc. of one-half per cent hydrochloric acid, after which it is rinsed, boiled one-half hour in distilled water, dried and weighed.

The acid-alkali method is given with many small variations, the A.S.T.M. method is as follows: a sample of fabric of one square foot is dried and weighed. It is then boiled 30 minutes in one-half per cent hydrochloric acid (the acid to be boiling when the sample is put in), removed and rinsed thoroughly, boiled 30 minutes in 1 per cent sodium carbonate, removed, rinsed, dried and weighed.

The enzyme method is also used in many slightly different forms, the A.S.T.M. and A.A.T.C.C. methods being practically identical. The A.A.T.C.C. method is as follows: a 10 gram sample is dried and weighed, rinsed in hot distilled water and is then immersed in 20 times its weight of a 3 per cent solution of a starch-solubilizing enzyme (such as Diastafor) at 60° C., squeezing 3 times with the solution to insure proper wetting-out. It is digested for 1 hour in this solution at 60° C. (temperature must not be allowed over 60° C. or the enzyme action will be destroyed), after which it is rinsed well in hot water, all loose fibers being collected on a 100-mesh sieve or a Gooch crucible. The sample is then boiled for 1 hour in distilled water and is rinsed again, after which it is squeezed, dried, and weighed.

The ammonium persulfate method is as follows: the cloth is cut up into one-inch squares and a 10 gram sample is dried and weighed. The sample is placed in a 250 cc. beaker, 150 cc. of boiling distilled water is added and it is boiled on a steam bath for 10 minutes. Then, 25 cc. of a 4 per cent ammonium persulfate solution is added, the beaker is covered with a watch glass, and it is boiled for 30 minutes. The sample is dumped out onto a 100-mesh sieve (or Gooch crucible), washed thoroughly under the tap, squeezed, dried, and weighed.

If the cotton sample has been through any sort of a scouring process (boil-out, bleaching, dyeing, or mercerizing) there is no correction factor to be applied, but if raw cotton has been used there is a correction factor necessary. Correction factors for the various de-sizing methods obtained by various authorities are given in Table XIV but these averages are those of a considerable range of values and any one specimen might be far away from the average, it is therefore safer to report the "loss on de-sizing" and state the method used, unless a sample of the cloth before finishing or sizing is available as a blank.

If the sizing or finishing material is a permanent finish (cellulose ether) the scouring method must be used. If the material has an anti-crease finish (synthetic resin) the

TABLE XIV

Loss on Desizing of Various Cotton Goods

Material	*Method*	*Loss Range*	*Loss Average*	*Loss Max.*	*Authority*
Boiled-out, Bleached, dyed	Any		0%		Various
Raw cotton	Scouring	3.5-5.1%	4.6%		Clibbens, Geake
Raw cotton	Scouring		3%		Dorèe
Raw cotton	Acid-alkali	2.6-3.9%	3.2%		A.S.T.M.
Raw cotton	Enzyme		3%		Dorèe
Raw cotton	Enzyme		1.75%		A.A.T.C.C.
Raw cotton	Enzyme	2.6-3.5%	3.2%		Clibbens, Geake
Raw cotton	Enzyme		3.2%		Howell
Raw cotton	Ammonium persulfate		3.2%		Howell
Cotton goods to be coated:					
Sheetings	Acid-alkali			8.5%	A.S.T.M.
Drills	Acid-alkali			11.0%	A.S.T.M.
Sateens	Acid-alkali			10.25%	A.S.T.M.
Broken twills	Acid-alkali			8.15%	A.S.T.M.

acid-alkali method should be used, although the scouring method would probably be satisfactory also; the enzyme method, however, would be useless on the synthetic resins. If the finishing material contains starch, any one of the methods may be used although the standard methods of the A.S.T.M. and the A.A.T.C.C. both specify the enzyme method. The A.S.T.M. does specify the acid-alkali method for materials which are to be rubber or pyroxylin coated and sets standards for the maximum "loss on desizing" which are given in Table XIV. The ammonium persulfate method has not been in general use but is worthy of more consideration; it is quicker and simpler than any of the other methods and if investigation shows that it will desize thorough it should be a valuable method, especially for routine work.

References:

(1) Matthews, J. M. Textile Fibers. John Wiley & Sons, Inc., New York. 1924.

(2) Dorèe, C. Methods of Cellulose Chemistry. D. Van Nostrand Co., Inc., New York. 1933.

(3) Trotman, S. R. and Trotman, E. R. Textile Analysis. J. B. Lippencott Co., Philadelphia. 1932.

(4) A.S.T.M. Standards on Textile Materials. A.S.T.M., Philadelphia. 1937.

(5) Year Book of the A.A.T.C.C.—Volume XIV. Howes Publishing Co., Inc., New York. 1937.

(6) Farrow, F. D. Sizing: A Review of the Literature. Journal of the Textile Institute *14,* T254 (1923).

(7) Smith, G. Detection and Estimation of Glycerol in Cotton Cloths and Sized Yarns. Journal of the Textile Institute *17,* T187 (1926).

(8) Neale, S. M. Determination of Deliquescent Substances in Sized Cotton Materials. Journal of the Textile Institute *17,* T511 (1926).

(9) Smith, G. Estimation of China Clay in Sized Cotton Goods. Journal of the Textile Institute *19,* T323 (1928).

(10) Derrett-Smith, D. A. Estimation of Starch on Finished Goods and Yarns. Journal of the Textile Institute *21,* T583 (1930).

(11) Clibbens, D. A. and Geake, A. Determination of Total Size or Filling in Cotton Goods. Journal of the Textile Institute *22,* T465 (1931).

(12) Fargher, R. G. and Lecomber, L. V. Determination of Starch in Sized and Finished Cotton Goods. Journal of the Textile Institute *22,* T475 (1931).

(13) Geake, A. Analysis of Sized Cotton: Determination of Zinc and Magnesium, and Some Qualitative Tests. Journal of the Textile Institute *23,* T279 (1932).

(14) Dehn, W. M., Jackson, K. E., and Ballard, D. A. Identification of Common Carbohydrates. Industrial and Engineering Chemistry Analytical Edition *4,* 413 (1932).

(15) Herman, B. X. Quantitative Determination of Starch as Sizing. American Dyestuff Reporter *22,* 511 (1933).

(16) Anonymous. American Dyestuff Reporter *24,* 325 (1935).

(17) Harold, B. A. Textiles and the Newer Synthetic Organic Chemicals. American Dyestuff Reporter *24,* 543 (1935).

(18) Amick, C. Crease-Resisting Fabrics. American Dyestuff Reporter *24,* 553, 622, 645 (1935).

(19) La Piana, F. G. Finishing of Textile Fabrics. American Dyestuff Reporter *25,* 416 (1936).

(20) Howell, R. E. Laboratory Methods for Desizing Cotton Materials. American Dyestuff Reporter *26,* 342 (1937).

(21) Cohoe, W. P. Permanent Sizing with Alkali Soluble Cellulose Ethers. American Dyestuff Reporter *26,* 375 (1937).

(22) Powers, D. H. Progress in the Resin Finishing of Textile Fabrics. American Dyestuff Reporter *26,* 783 (1937).

(To be continued)

PROCEEDINGS OF THE

American Association of Textile Chemists and Colorists

SEPTEMBER 5, 1938

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CALENDAR OF COMING EVENTS

Meeting, Southeastern Section, Officers Club, Fort Benning, Ga., near Columbus, Ga., Sept. 10, 1938.

* * *

Meeting, New York Section, Swiss Chalet, Rochelle Park, N. J., October 28, 1938.

* * *

Annual Meeting and Convention, Atlanta Biltmore Hotel, Atlanta, Ga., December 2 and 3, 1938.

* * *

ANNUAL OUTING, NEW YORK SECTION

THE annual outing of the New York Section was held on Friday, June 10th, at the North Jersey Country Club, Paterson, N. J. Approximately two hundred members and guests were gathered to enjoy golf, tennis, horseshoe pitching and good fellowship. A banquet was held in the evening which was followed by the awarding of numerous prizes and a well-balanced program of entertainment.

It was the unanimous opinion of those who attended that the outing was one of the most successful enjoyed by this section. The committee for the outing was composed of the following: A. J. Royce, Chairman, George L. Baxter, Henry F. Herrmann, Ephraim Freedman, P. J. Kennedy and Paul A. Dunkel.

A number of snapshots taken at the outing are shown on the following page.

Respectfully submitted,
P. J. KENNEDY, *Secretary.*

Annual Outing, New York Section

The Dyeing and Finishing of Rayon Hosiery*

ROSS M. STRIBLING**

THE hosiery industry was one of the first major divisions of the textile industry to adopt rayon for large scale manufacture. In the early days the dyer of rayon hosiery was confronted with many problems among which the most serious were probably the ease with which holes developed during dyeing and boarding, the difficulty of getting an even dyeing free from light and dark bars or stripes, the near impossibility of securing a good union between rayon and mercerized cotton, and the frequent presence of oil or grease spots on the finished goods. Realizing the great possibilities of this new fiber, the rayon manufacturer, dyestuff manufacturer, and dyer began to cooperate in a concerted effort to determine the cause and solution of these difficulties. The rayon manufacturer by extensive research and careful control over the manufacturing process greatly improved the strength and physical and chemical uniformity of this product, matched its dye index approximately with that of mercerized cotton, and developed coning oils for lubricating the yarn, that readily emulsify in water. The dyestuff manufacturer has improved old types and developed new ones specially suitable for evenness, unions and multifiber crossdyed effects. The dyer has learned to choose carefully the dyestuffs best suited to his problem and to apply them by methods adjusted to the properties of the goods in process. The result is that the dyer is now able to produce a high percentage of first class goods free from holes, dye bars and oil spots.

The conclusion should not be drawn from the above that your speaker feels that all the problems have been solved and that dyeing rayon hosiery is a simple matter of following an easily established routine. To the contrary many problems now remain to tax the ingenuity of all concerned. However, the difficulties encountered in dyeing hosiery of rayon are no more serious than those met with in processing hosiery of the older textile fibers.

It is interesting to note that during 1937 out of a total domestic rayon consumption of 198,500,000 pounds, 9,700,000† pounds or about 5% was used by the hosiery industry.

In this paper your speaker makes no attempt to introduce any radical innovations or new theories regarding the subject, but instead endeavors to present a general discussion of the methods ordinarily accepted by the trade as good practice, and perhaps some idea of the rayon manufacturer's viewpoint on this subject.

Success in dyeing rayon hosiery is dependent upon the careful consideration and coordination of several factors, which will be discussed at length, namely:

1. The type and condition of the hosiery.
2. The dyeing machine.
3. The constituents of the dye bath.
4. The dyeing process.
5. The finishing process.

THE TYPE AND CONDITION OF HOSIERY

Rayon is used in almost every type of hosiery. Ladies' full-fashioned goods are frequently made with rayon leg and rayon or mercerized cotton top, toe, sole, and heel in 39 and 42 gauges, and with silk leg, rayon top and rayon or mercerized cotton heel, sole and toe and toe in 39, 42, and 45 gauges. Dull luster rayon in 100, 125, and 150 deniers is most frequently used in the above. Lower deniers, such as 75 and 50, result in a very sheer stocking resembling more nearly the appearance of silk, but their use for purposes other than double sole, plating and plying work is at present rendered impractical by their low strength, which causes poor running quality in knitting and the development of excessive holes in dyeing and boarding. However, rayon manufacturers are now working toward the development of stronger low denier yarns in the belief that this improvement will greatly increase the use of rayon in full-fashioned hosiery.

Ladies' seamless goods are usually made with rayon top and leg and with plain or mercerized cotton in the heel and toe. The inside of the top is sometimes constructed of plain cotton. Stripes of dyed or white silk or acetate yarn are frequently knit into the tops of both full-fashioned and seamless stockings as a decorative feature. The white stripes must at times be cross dyed in a color contrasting with that of the stocking. Rayon yarns most commonly used in these goods are 100, 125, 150, and 200 denier dull luster. Other ladies' seamless goods in the coarser needle numbers are made with rayon plated

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**Customer's Service Department, The American Enka Corporation, Enka, N. C.

†The Textile Organon

over cotton in the leg and top and plain cotton, mercerized cotton or linen heel and toe. Bright or semi-dull rayon in 100, or 150 denier is ordinarily used in these goods.

Men's half-hose, ladies' anklets and children's socks are commonly made with top, toe and heel of plain or mercerized cotton and with the remaining parts of rayon alone, plied with silk, cotton or acetate, or plated with silk, cotton or acetate. Stripes or clocks of silk and/or acetate to be cross-dyed are often included in these goods. During recent years spun or cut rubber covered with cotton has become increasingly popular in tops. This has no influence on the dyeing procedure except when the rubber strand is laid under excessive tension resulting in difficulty with dye penetration. Almost all deniers and lusters of rayon manufactured in quantity are used in half-hose and anklets with bright and semi-dull predominating in plied and plated numbers and with semi-dull and dull finding greatest use when rayon alone is employed.

Rayon having a low number of fairly coarse filaments is preferable in most kinds of hosiery to multi-filament yarn having very fine filaments, since goods of the former have better body, more elasticity, hold their shape better and are less likely to contain distorted stitches and "crow's feet."

The characteristics of the rayon are of vital concern to the hosiery dyer. Strength both wet and dry should be the maximum obtainable in the respective denier and luster. Stiffness should be sufficient for the goods to hold their shape and have a firm springy hand without harshness. A naturally harsh rayon stocking is very difficult to soften. Dye index should be approximately that of the average mercerized cotton yarn when dyed in shades of medium depth using dyestuffs having good unionizing property. Rayon has a natural tendency to dye some darker than mercerized cotton in very dark shades and some lighter in very light pastel shades. In the latter case particularly the dyer has difficulty in obtaining a good union. However, he can usually obtain a commercially acceptable union by careful selection of dyestuff and proper adjustment of the dyeing process.

The affinity for dyestuff must be uniform, within reasonable limits, throughout the length of the thread. One of the most difficult problems that confronted the rayon manufacturer was that of eliminating differences in dye affinity existing in different sections of a spinning traverse and in the outside and inside of a spinning package. These difficulties have been largely solved by improvements leading to more uniform ripening of the viscose solution, to more uniform coagulation of the threads during spinning, to more uniform tension during coagulation and spooling, and to the development of a spinning package in which all portions may be washed free of acid at a uniform rate.

Oil applied during the coning operation should be present in minimum quantity necessary for good knitting, and should be of such quality that it will not rancidify or set during prolonged storage and will readily come off the yarn and emulsify, of its own accord, when entered into the warm dye bath. Coning oils were formerly a frequent form of trouble to the dyer, but at present it is believed that the best grades give very little difficulty. For example, the oil used by one manufacturer has been allowed to remain on rayon cones for over five years without any signs of deterioration developing on either yarn or oil.

Mercerized cotton when present in the goods should have a uniform dye rate about the same as that of the rayon. Dye bars seem more prevalent in mercerized cotton than they are in most of the rayon now produced. In fact rayon manufacturers often wonder how it is that dye bars in mercerized cotton seem to pass hosiery buyers unnoticed which if present in rayon would result in complaints and the rejection of the goods or payment of claims.

New lots of dye to resist silk present in clocks or stripes of men's half-hose or children's socks should be carefully tested, before commercial dyeings are made, to determine the fastness of the colors and how high a temperature and what dyeing assistants may be used in the bath without causing staining or bleeding of the yarn. This timely step will occasionally prevent a ruined lot of goods and a delayed delivery.

Hosiery, irrespective of type, should be relatively free from metal laden grease and dirt and should contain a minimum of machine oil. The practice of frequently drenching the needles of a knitting machine with mineral oil is of negligable advantage to the knitter, and is a big disadvantage to the dyer, which can only result in increased scouring and dyeing costs if first class goods are to be produced.

Best results are ordinarily obtained by dyeing ladies' hosiery in dye bags, about two dozen pairs of average goods per bag. In the case of very loosely knit numbers, three dozen pairs per bag is permissible. These goods should be received by the dye house after shaking out and bagging, ready for dyeing. The dyer usually has sufficient duties directly connected with dyeing, that can be done by no other person in the mill, to bother him without the additional needless responsibility of having lots assembled and bagged. A few mills do not use bags for ladies' stockings of rayon because they believe that mesh marks will result. However, the writer's observation does not confirm this, and it is believed that the additional holes and chafe marks produced by dyeing out of bags will more than outweigh any advantages from a possible reduction of mesh marks.

Men's half-hose are seldom bagged for dyeing except in a few instances when the style contains a very delicate silk plating effect.

DYEING MACHINE

The modern hosiery dyeing machine, which is the result of many years' development, is generally regarded as being capable of performing its duty in a highly satis-

factory manner. The rotary drum machine is most widely used on all types of hosiery. It consists of a cylinder, divided into sections or pockets, having a perforated side and solid ends, built to revolve on horizontal bearings in a cylindrical tank, the lower portion of which contains the dye bath. The goods are placed in the pockets and their positive circulation through the bath is insured by the revolving motion of the drum, the direction of turning being automatically reversed at frequent intervals. The well-known properties of Monel metal make it the most popular material for construction. This machine thoroughly circulates the goods with minimum rubbing and tangling in a bath, the volume of which may be adjusted within limits according to the weight of goods being processed.

The older type paddle machine continues to be favored by some dyers, principally in the northern section of our country. This consists of a roughly semi-cylindrical tank with a large revolving paddle wheel mounted on top, containing blades extending from center to rim which circulate or "kick along" the dye liquor and goods which rise to the surface of the bath. This machine is now used more for half-hose, socks and anklets than for ladies' goods. It gives good penetration but at the same time more chafing and tangling and more of a tendency toward cloudiness or spotting, if additions of dye are made after prolonged running, than the drum type of machine. The dye bath cannot be reduced in volume when it becomes necessary to run less than a full size lot because circulation by means of the paddle would be eliminated. This of course results in increased steam, dye and chemical costs on small lots.

However, it is believed that a good dyer can produce commercially acceptable results on either type machine by making himself familiar with the peculiarities of the respective machine.

Unfortunately for some dyers, financial expediency demands that their equipment purchases be based on what is cheapest in the second hand market rather than that on what will produce the best quality with the lowest operation cost. This practice places both the dyer and the mill at a considerable disadvantage in competition with other mills which have been able to pursue the wiser long range policy.

CONSTITUENTS OF THE DYE BATH

In a discussion of constituents of a hosiery dye bath, water should receive first consideration for two reasons: first, it is present in greatest volume in the bath, and second, it is one of the principal sources of trouble to the dyer. Few hosiery dye houses are large enough to justify retaining a water expert to keep a close check on the condition of water, and the dyer is too busy getting out production and samples to spare the time necessary for frequent elaborate analysis. Consequently the dyer must take the water as he finds it, and when something is wrong he has little chance to discover it before a dye lot shows the trouble. Then he must try to overcome the trouble in the best way that he can, frequently without definitely knowing the cause.

It is interesting to note in this connection that some rayon manufacturers probably spend more money on controlling and conditioning water than they spend in regulating any other single substance that is used in their manufacturing process.

Soft water is of course most desirable for hosiery dyeing. Next to natural rain water, that purified by filtering and the action of soda ash and alum with subsequent softening by zeolite treatment is usually best. Most hosiery mills in this section use city water which has been filtered and treated with soda ash, alum, and perhaps chlorine to disinfect. This leaves hardness, or the presence of calcium and magnesium salts, and certain iron compounds, as the most common causes of trouble. Hardness is most efficiently and economically eliminated by treating the water with zeolite. Fortunately an increasing number of progressive mills are installing water softening systems. Mills so equipped should have no hard water problems if they will regenerate the zeolite at specified intervals.

Many dyers do not have water softening equipment at their disposal and must use hard water and produce first class goods free from "nigger heads." For this situation there are available on the market a number of agents such as sodium hexametaphosphate, sodium pyrophosphate, highly sulfonated castor olive oil blends, aromatic sulfonic acids and their salts, sulfonated aliphatic alcohols, fatty acid condensation products and compounds containing these substances, and others which are offered under well known trade names. The respective manufacturers claim that the addition of these compounds to the processing baths render the hard water salts harmless to the goods. It has been your speaker's experience that these compounds for maximum effect should be dissolved and added to all scouring, dyeing and rinsing baths as the tank is being filled and before the water level reaches the goods. Any dyer having hard water trouble is justified in experimenting with these agents to determine which if any is best suited to his particular condition.

The substitution of ordinary sulfonated oils for soap in some instances reduces or eliminates hard water soaps, but this is seldom done on account of the increased expense.

Iron salts may affect the color of some dyestuffs and exert a catalytic effect in bleaching, causing tendering and holes. Softening equipment eliminates some forms of iron, and aeration, or spraying the water through air, eliminates most of the others. Little can be done in the dye house to eliminate iron from water, but the addition of certain compounds said to be absorbed by iron causes its bad effect to be reduced.

Aluminum salts, exerting an irregular water-proofing effect on the goods, may be present due to the addition of excess amounts of alum in the filter plant. The addition to baths of the agents mentioned in connection with

hardness frequently renders a temporary condition due to the presence of these salts less serious.

pH of the water should be 7.0 or slightly above. Small variations in this factor do not appear to exert a very important effect in rayon dyeing. However, a low pH seems to bear some relation to difficulty in getting dyestuff additions to go on the goods, and a high pH seems to have some connection with a tendency for dyestuff additions to "jump" on the goods. Some effect, varying with different dyestuff, appears to be exerted by pH on the union or depth of color obtained on mercerized cotton and rayon respectively in the same bath. Little definite information is now available on this subject but a thorough investigation of it would probably have practical value.

Chronic trouble with water following heavy rains is so common in some dye houses that the dyer almost begins to think of preventative measures when he observes the gathering of dark clouds in the sky.

The second necessary constituent of a hosiery dye bath is the dyeing assistant. Under this broad term come soaps, oils, wetting-out and dispersing agents, detergents. etc. The compounds used must in most cases serve the double function of cleaning the goods of oil, grease, dirt and other impurities and of carrying the dye stuff uniformly to every portion of the goods.

Soap is the most commonly used and perhaps the most effective agent for this purpose. A good grade of neutral palm or olive oil soap exerts a scouring and detergent action without injury to the goods, and at the same time has a leveling and retarding effect on the exhaustion of the dye bath. It has the additional property of holding most of the foreign matter cleaned from the goods in emulsion or uniform suspension in the bath, and of preventing it from being deposited on the goods. The lubricating action prevents chafing of the goods and facilitates free easy circulation in the dye bath. This combination of properties is useful in helping to overcome small defects that may influence the evenness of color and appearance of the hosiery.

Ordinary sulfonated oils may be used in addition to soap with good advantage when better penetration of dyestuff and a softer more lustrous effect is desired. These products also help in keeping mineral oil, which has been removed from the goods, in emulsion in the dye bath during prolonged processing. When sulfonated oils are substituted for soap entirely in sufficient quantities to provide equivalent leveling and retarding action in the bath, the detergent action of soap is frequently missed and the cost is usually greater.

The newer synthetic wetting out agents, or mixtures containing them, have been receiving increased attention and use in hosiery dye houses during the past several years. Some of them are of considerable value in supplementing the action of soap and in replacing soap in plants where hard water must be used. Many such agents exert a penetrating, dispersing and leveling action that has been obtained in no other way. The rising price of oils occasioned by the Spanish war has tended to increase the popularity of these compounds.

The addition to the dye bath of small amounts of alkaline materials such as soda ash, trisodium phosphate, etc., aid materially in cleaning dirty or oil laden goods, and in overcoming small variations in the dye affinity of rayon. Dyestuffs to be used in such a bath must be chosen for their stability to alkali.

The third necessary constituent of the hosiery dye bath is the dyestuff. Direct or substantive dyestuffs are used almost universally on rayon hosiery. From the large numbers of color types available in this group the dyer must choose those best suited to the conditions under which he must work and to the requirements which he must meet. Dyestuff manufacturers render valuable assistance in recommending colors that are ordinarily suitable under similar conditions and in keeping the dyer informed regarding new types that are introduced. Rayon manufacturers through their customer's service departments endeavor to assist in determining the dyestuffs and processes best suited for their respective products.

Dyestuff selections are usually based on indications obtained in laboratory tests followed by practical trials of the colors on which favorable results were obtained. Tests should be made to determine the usual properties sought in dyestuffs, such as fastness, even exhaustion, money value, etc., and should include in addition the property of leveling readily and covering up slight variations in dye affinity that may occasionally be present in lots of rayon or mercerized cotton. Realizing that the average dyer has neither the time nor the facilities for testing the leveling property of a dyestuff your speaker has done some work along this line using the following method:

A batch of rayon is specially spun to have an uneven dye rate averaging higher than that of normal yarn. Another batch is specially spun to have an uneven dye rate averaging lower than that of the normal yarn. Tubes, weighing 10 grams each, are knit with one-half from yarn having the higher dye rate and with the other half from yarn having the lower dye rate. The mid-point in the tube where one yarn ends and the other begins is plainly marked by a slight stitch change for one revolution of the knitting machine. Ten of the above tubes are required for testing each dyestuff. A cold 2 liter solution is made containing:

Dyestuff, 1.0 gram—1.0 per cent on total weight of tubes—100 grams.

Olive oil soap, 2.0 grams—2.0 per cent.

Common salt, 5.0 grams—5 per cent.

The ratio of bath to rayon is 20:1.

The solution is divided into 10 equal portions of 200 cubic centimeters each, which are poured into Monel metal beakers of 600 cubic centimeters capacity. Five of these portions are heated to 140-150° F., and a knit tube is entered into each and dyed for 5, 10, 20, 40 and 60

minutes, respectively, a temperature of 140-150° F. being maintained throughout the dyeing period. The remaining 5 portions of solutions are heated to temperatures of 80, 120, 160, 180 and 212° F., respectively, and a knit tube dyed in each of these for 45 minutes at the above temperatures. The dyed tubes are rinsed thoroughly in cold water, run through a wringer, boarded, tagged, cooled, steamed lightly and inspected.

Dyestuffs which color the tubes, as deeply and evenly in 10 minutes at 140-150° F. as they do in 60 minutes and which color the tubes as heavily and evenly at 160° F. or below as they do at higher temperatures usually prove to be the most level dyeing colors in commercial practice. A comparison of the evenness obtained in tests of different dyestuffs gives a fairly reliable indication of which may be expected to produce the most level results over a period of time. By subjecting mixtures of different dyestuffs to this test it has been possible to obtain a very good impression of how the combination will work in practice.

Of course, a few dyers will take the position that they have enough problems of their own to solve without worrying about troubles that may be due to the yarn. However, everyone who has dyed hosiery for several years knows that every manufacturer has in the past produced some bad yarn and he has good reason to believe that in spite of all the precautions a yarn manufacturer may observe, a few lots of yarn will be produced in the future, that are not absolutely perfect. Therefore most dyers will agree that the interests of all concerned are best served by the use of dyestuff and dyeing procedures, when otherwise possible, that tend to cover up defects irrespective of where the fault lies.

A test of the unionizing property of a dyestuff when applied to rayon and mercerized or plain cotton is frequently useful. The following procedure has been successfully used in testing for this quality:

Nine tubes weighing 10 grams each are knit, containing 1½ inches of mercerized or plain cotton yarn on each end, with the remaining portion of normal rayon in the luster and denier to be tested. Four courses each of white spun silk and acetate yarn are often inserted in each tube, enabling the effect of the dyestuff on these fibers to be determined at the same time.

Three solutions are made to the volume of 900 cubic centimeters each. Since 3 10-gram tubes are to be dyed in each of the above solutions, the ratio of bath to goods is 30 : 1.

The first solution contains:		
Dyestuff .... (On weight of tubes)	0.2	per cent
Sulfonated castor oil.....	5.0	per cent
The second solution contains:		
Dyestuff	0.7	per cent
Sulfonated castor oil.....	5.0	per cent
The third solution contains:		
Dyestuff	2.4	per cent
Sulfonated castor oil.....	5.0	per cent

Each of these solutions is divided into three portions of 300 cubic centimeters, each of which is poured into a Monel metal beaker.

The first portions from each of the solutions are heated to 110° F. and the tubes entered; then the temperature is raised during 10 minutes to 160° F., at which the baths are held for the remaining 30 minutes of dyeing time. Common salt 5.0 per cent is added 30 minutes after the tubes are entered.

The second portions from each of the solutions are heated to 110° F., tubes entered and the temperature raised during 10 minutes to 175° F., at which the baths are maintained for the remaining 30 minutes of dyeing time. Common salt 10.0 per cent is added 30 minutes after dyeing begins.

The third and last portions from each of the solutions are heated to the boil, the tubes entered and the temperature held at the boil during the entire 40 minutes of dyeing time. Common salt 15.0 per cent is added 30 minutes after dyeing begins.

The tubes are then removed from the bath, rinsed thoroughly in cold water, run through a wringer, boarded, tagged, cooled, lightly steamed and inspected.

These tubes give an indication of the union that may be expected from the dyestuffs in concentrations of 0.2, 0.7 and 2.4 per cent when applied at maximum temperatures of 165, 175 and 212° F. using common salt in amounts of 5, 10 and 15 per cent. The effect of these treatments on acetate and resist silk decorative yarns is also determined. These conditions would seem to pretty well cover those under which good unions on half hose or stockings might be obtained under ordinary circumstances.

To date time has not been available for testing all the dyestuff types on the market, only about 500 having been completed, but from this number only a very few have been found which give a good union in some of the light pastel shades.

Accurate laboratory dyeings can assist very materially in reducing the amount of time and trouble required for matching the first commercial lot in a new color. Formulas developed in a laboratory are regarded as worthless by a few dyers, usually because proper care has not been used in developing them. If care is taken in the laboratory to use beakers of the same material as the machine, the same ratio of bath to goods as will be employed in the machine, the same percentages of soap and salt as will be employed in practice, with reasonable accuracy in measuring out the dyestuff, it is believed that the laboratory dyeing will approximately check with the commercial dyeing in most cases.

It is a well known fact that laboratory tests only indicate, and that practical use over a period of time involving dyestuff from several different manufacturing batches is the only final test.

The fourth usual constituent of a hosiery dye bath is

salt. Salt serves the well known function of forcing the dyestuff out of the bath onto the goods. Common salt is most frequently used and is quite satisfactory for dark shades, and for light shades when the goods are of a construction which is readily penetrated and the salt is added in small quantities at a time. Common salt exhausts a dye bath more suddenly and in a more abrupt way than Glauber salt when equal quantities of each are used. If, however, the goods are of a construction which is difficult to penetrate and the dyer prefers to add his salt in large single additions, Glauber salt is more likely to give a level result in the lighter colors because of its more gentle and gradual action.

DYEING OPERATION

The method used in dyeing rayon hosiery depends principally upon the type, physical and chemical condition of the goods, and upon the decorative yarns of other fibers present which must be left unaffected or dyed.

Seamless and full-fashioned ladies' hosiery of rayon or rayon and mercerized cotton are usually dyed in about the same way.

The process most commonly used on stockings which are in good condition, containing a minimum of oil, grease, dirt or other foreign matter, consists of the following: Prepare a bath containing trisodium phosphate, soda ash, sodium hexametaphosphate, or sodium pyrophosphate, if desired .....0.1 to 0.5 per cent
Olive oil soap ..... 4.0 to 6.0 per cent
Sulfonated oil or wetting-out agent, if desired, 0.25 to 2.0 per cent.
Necessary dyestuff. (When alkaline agents are used care must be taken that the formula contains no dyestuffs which are sensitive to these materials.)

Heat this bath to the boil and enter the bagged goods into the machine. Circulate the goods for 15 to 20 minutes at the boil. Then add common salt 5.0 to 8.0 per cent and circulate for 20 to 30 minutes at the boil and sample. If more than 8.0 per cent of salt is used, it is advisable to divide the amount in halves and to add the two portions at 5 to 10 minute intervals. When the color has been matched the bath is dropped and the goods are rinsed for 5 to 10 minutes in a fresh cold bath. This procedure will under most conditions result in goods of good feel and appearance at a minimum of time and expense. A few mills dispense with the rinsing operation, taking the goods directly out of the dyebath and extracting them. This eliminates "nigger heads," but increases the chances of spotted goods and usually detracts from the feel.

Other procedures, in which the one bath method is employed, differ from the above in that the starting bath does not contain dyestuff, the goods being given a preliminary scour for 10 to 15 minutes at 120° F. or the boil after which the dissolved dyestuff is added, the temperature of the bath being gradually raised to the boil if it is not already there, and dyeing continued as previously described. The dyers who employ these methods believe that the preliminary scour provides a cleaner and more uniform condition of the goods on which the dyestuff may be applied more uniformly and with better penetration. This is no doubt correct with some goods under certain conditions, but it seems that on ordinary goods with the conditions usually encountered the best results are obtained by entering the dry goods directly into the boiling dyebath.

When the goods are in bad condition, containing large amounts of dirt, grease or mineral oil, or when a batch of rayon having a tendency to dye unevenly must be processed, it is advisable to give the goods a separate preliminary scour before dyeing. A procedure that is occasionally used follows: Prepare a bath containing,

Soda ash ..... 1.5 to 6.0 per cent
Soap ..... 4.0 to 8.0 per cent
Oil and wetting agents if desired ..... 0.1-2.0 per cent

Heat this bath to 120° F. and load the machine with the bagged goods. Run the goods 10 minutes while heating the bath from 120° F. to the boil. Then run for 15 to 30 minutes at the boil. Rinse the goods in a fresh warm bath for 10 to 15 minutes. Extract and unbag the goods, then untangle and rebag them. Prepare the dyebath containing:

Olive oil soap..... 3.0 to 6.0 per cent
Oil and penetrating agents if desired ..... 0.1-2.0 per cent
Necessary dyestuff.

Load the machine with the damp bagged goods, the bath being at the boil. Run the goods for 10 to 15 minutes at the boil, add the necessary salt and continue dyeing until the shade is matched. The cost of this method is some greater than that of the one bath method, but it is much cheaper to treat the good in this way than it is to dye in one bath, board, pair, and then to have most of the goods sent back for redyeing. This procedure is too elaborate for regular use but it is advisable when occasional doubtful or bad lots must be processed.

When the goods contain acetate or dyed silk peco top that must be left unstained, no alkaline agents should be used in any stage of the dyeing process. Dyestuffs for the rayon and cotton must be selected that do not affect the decorative stripes. Sometimes it is necessary to hold the maximum dyeing temperature down to 180° F. Most dyers feel that a decorative yarn is impractical for this purpose, if it is ruined by dyeing at the boil. Acetate dyestuff may be added to the regular formula when it is necessary to dye these stripes.

Ladies' seamless hosiery of rayon and plain cotton is usually dyed with about the same dyestuff and procedure as that employed on rayon-mercerized cotton goods. The union obtained is usually bad, the hosiery buyers having become accustomed to and accepting it. A low starting temperature is best for this type of work. When a buyer demands a big improvement it can frequently be obtained by using a low dyeing temperature and little, or better

still, no salt. Although the cheapest dyestuffs may be employed, the cost is usually increased to the point where this method becomes impractical on a cheap grade of merchandise.

The most satisfactory results which your speaker has seen on ladies' seamless or full-fashioned hosiery of mercerized cotton and silk with rayon top were obtained by the two bath method applied in the following way:

Scour and degum the bagged goods, in a bath containing 6.0 per cent of degumming oil having a sulfonated castor base, for 20 to 30 minutes at the boil. Rinse thoroughly hot and cold for 10 minutes each, extract, unbag, untable and rebag. Make a bath containing:

Sulfonated castor oil—6.0 per cent.

Necessary dyestuffs for rayon, mercerized cotton and silk.

Heat this bath to the boil and load the machine with the damp bagged goods. Run the goods for 20 minutes at the boil. Then add calcimated Glauber salt 3.0 per cent to the bath twice at a 15 minute interval. Continue to run at the boil for 10 minutes and sample. Since these goods must usually be finished, the colors of the rayon, mercerized cotton and silk must be separately matched to an unfinished model from a lot that is known to have produced a good union when finished. Some dyers prefer to finish each sample when matching the shade. Irrespective of the method used, the different change in color usually produced on rayon and silk by some silk finishing compounds must be allowed for in the original color match, if a good union is to result on the finished goods. The color being matched the goods are rinsed cold for 10 minutes and finished.

Men's half hose of rayon and mercerized cotton should be beaten out before dyeing. This consists of grasping the toes of a dozen pairs in the hand, dipping the tops in warm soap solution, and vigorously beating the tops over the rounded surface of a smooth piece of pipe or wood. The tops are thus pulled lengthwise and contracted widthwise causing them to fit the boards more closely after dyeing. The cleaning and wetting-out effect of this treatment is also beneficial. The usual dyeing process is as follows: Load the machine with "beaten out" socks in loose condition. Fill the machine to the proper level with cold water, or preferably, with water at 120° F. if hot water is available. Add

Alkaline agents, if desired..	0.1 to 0.5 per cent
Olive oil soap.....	3.0 to 8.0 per cent
Sulfonated oil or other wetting-out agents, if desired.	0.2 to 2.0 per cent

Heat the bath to 120° F. and run for 10 minutes at this temperature. Add the thoroughly dissolved dyestuff specially chosen for evenness and unionizing properties. Run the goods 5 to 10 minutes at 120° F. Raise the temperature of the bath to the boil during 10 to 15 minutes of continued running. Dye at the boil for 5 to 10 minutes and add 6.0 to 25.0 per cent of common salt to the bath. Continue running for 10 to 15 minutes and sample. When the color is matched, rinse the goods and unload the machine. This procedure is economical, consumes little time, and is used successfully by many mills.

Socks of rayon and plain cotton are processed in about the same way as that described above for rayon and mercerized cotton goods. The remarks previously stated regarding the dyeing of rayon cotton ladies' hosiery also apply to men's socks of the same materials.

The dyeing operation for men's socks of mercerized cotton and rayon is somewhat complicated by the frequent presence of silk or acetate plied yarns to be cross-dyed. Degumming oil 5.0 to 6.0 per cent and silk dyestuff must be added usually to the above method when undegummed silk is contained in the style. When the acetate yarn is to be dyed, acetate dyestuffs are added and the maximum temperature frequently held below 185 or 190° F. When either acetate or silk is present anywhere in the sock, dyestuffs for the rayon and mercerized cotton must be selected which will not stain these fibers or destroy the desired effect. It may be well to add that to talk about finding these dyestuffs is very easy, but actually to find a complete range which will give practical results has been a very difficult job. Alkaline agents of every kind should be left out of dyebaths in which silk or acetate effects are processed. A dyeing temperature not exceeding 180° F. is advisable for goods containing resist dyed spun silk. In the case of some silk clocking yarns which have been dyed with very delicate colors, sulfonated castor oil should be substituted for soap in the hosiery dyebath, and the temperature should not exceed 150° F. if the color effect is to be retained.

Anklets are processed in about the same way as men's half-hose with the exception that the goods are not "beaten-out."

THE FINISHING OPERATION

The finishing operation really begins with the scouring and dyeing operations. The complete removal of mineral oils from goods in the scouring and dyeing treatments, the addition of sulfonated oils and certain synthetic wetting-out and penetrating agents to the bath, and a thorough rinse after dyeing to complete the removal of harshening foreign matter all tend to produce a softer finish on the resulting goods. This is to a certain extent desirable on ladies' hosiery and anklets; however, some buyers of men's hosiery seem to prefer a rather hard wiry feel. Softness in rayon hosiery to the extent of losing body is generally considered a disadvantage. Bearing these facts in mind the amount and type of dyeing assistants present in the bath should be adjusted accordingly. A special wet finishing treatment after dyeing is seldom given to rayon hosiery.

Full-fashioned silk goods with rayon tops are dulled, splash proofed and finished in about the same way as all-silk goods.

After dyeing, most types of rayon hosiery should be given a thorough cold rinse. The extraction which follows soon after, should run no longer than the minimum time necessary for the goods to be handled by the boarders without burning their hands. A short run in a high speed extractor leaves a more uniform moisture content in the goods than a long run in a low speed extractor. It is your speaker's opinion that most mills extract their goods for too long a time, leaving them so dry that needless drying spots and stitch distortions result on the finished goods. The extracted goods should be left in the dye bags and should be immediately covered with other damp bags after being placed in the truck.

Boarding should follow as soon after extraction as possible. The practice of letting extracted goods set over night before boarding is unfortunate but frequently necessary. When this must be done the goods should be left a little damper than usual.

Good boarding results are being obtained by gently beating out the tops of the goods and drying on a boarding machine. It is your speaker's opinion that goods boarded on a properly adjusted machine have a very good chance to dry evenly and as a result to be free from drying spots and stitch distortions.

Of the stationary boards those heated by hot water are preferable to those heated by steam, the lower temperature of the former reducing the chances for the leg of a stocking or sock to be partially dried in the wrinkled condition while the boarder is fitting the foot on the form.

Boarders make an unfortunate practice of filling the troughs beneath the boards with goods. When this is done the goods that have lain in the trough for the longest time are usually partially dry before boarding and consequently present a rough distorted appearance when finished. For best results not more than two bags of ladies' goods should be emptied into a trough at a time.

It is realized, however, that the dyer must get results using the equipment which he has available, also that the dyer when responsible for boarding does not have time to enforce regulations regarding the number of bags to be emptied into a trough at one time. Without the above precautions possibly goods are produced which usually get by the market, but in times of quiet business the concern that has a reputation for delivering the smoothest, most attractive merchandise usually gets the business, competitive prices being equal.

DISCUSSION

Dr. Rupp: Is there any discussion of Mr. Stribling's paper?

Mr. H. Grady Miller: I would like to ask Mr. Stribling this question. He was speaking of the necessity of removing mineral oil. What is your opinion of the removal of mineral oil?

Mr. Stribling: It will ordinarily precipitate. I do not think it will act as a catalytic agent in its tendering of your goods, but it will precipitate it, but if there is any dirt or fine particles, that will be collected in the oil and finally settle in the goods, causing spots. I believe a thorough cleaning of the goods is essential for peroxide treatment.

Mr. Miller: You consider a full scour the safest?

Mr. Stribling: Yes. Of course, if your goods are clean and the oil on the rayon will readily emulsify it will be safe to use a one bath process, but if not, use two baths.

Mr. Miller: You mentioned that some dye houses have "nigger heads." Do you know anything that will dissolve the "nigger heads" after they are once formed?

Mr. Stribling: I saw one plant that used about two inches of gasoline on top of their bath. They got rid of them, but I am afraid the insurance inspector might have objected. I understand there are some specialty product solvents which employ some aliphatic halogen hydrocarbons having relatively high boiling point, which help to remove the "nigger heads."

Mr. Miller: You also mentioned giving a boil-off in your goods and then shaking them up again.

Mr. Stribling: I do not recommend that for regular practice. I recommend it when the goods are known to be dangerous, when they are known to be of a bad lot of rayon or have an excessive amount of dirt or mineral oil. Ordinarily I think the one-bath method is preferable.

Mr. Miller: When they have that excess dirt, don't you think that almost the usual time or in excess of ten minutes would remove that excess dirt?

Mr. Stribling: I doubt it in the one-bath process. I prefer the two-bath process when the goods are bad. Of course that is more expensive, but in the long pull I believe it is more economical.

Mr. Miller: You mentioned that the bath should be neutral, if you had colored yarn.

Mr. Stribling: That was a general statement. A pH of 7 is preferable for any dye bath or slightly above.

Mr. Miller: If you had a dyed yarn in the construction and had a silk that had to be degummed, you ought to have an alkaline bath to degum?

Mr. Stribling: Yes, that is true, but when that condition is not present I like the pH of 7 and slightly above best. All of those statements are when other factors make it possible.

UNEMPLOYMENT REGISTER

Members of this association, who are without employment, should forward to the secretary a statement as to their qualifications and experience. This information will subsequently appear on these pages with an identifying key number. Employers are also requested to file with the secretary or the American Dyestuff Reporter any vacancies which may occur in their businesses.—H. C. Chapin, Secretary, Lowell Textile Institute, Lowell, Mass.

Key: A—Laboratory and research; B—Dyeing or printing; C—Finishing; D—Sales; E—Instruction; F—Executive.

NOTE: PERSONS WHO HAVE OBTAINED EMPLOYMENT SHOULD NOTIFY THE SECRETARY OR THE AMERICAN DYESTUFF REPORTER AT ONCE. Prospective employers may file vacancies either with the secretary or the American Dyestuff Reporter.

A-4

Education—University of South Carolina, New York University, Philadelphia Textile School.

Experience—Chemist for 3 years with dyestuff company; 1 year as chemist in dyeing plant on pure and tin weighted silks and rayon; 3 years plant chemist for cotton dyeing, printing and bleaching plant. Can install Rapidogen system, including construction of necessary equipment.

Married; age 31; references. Will go anywhere.

A-B-1

Education—Graduate chemist and colorist from a leading textile institute. Speaks French fluently. High standing at school. Awarded 1st prize in chemistry. Member of honor society.

Experience—Knowledge of most processes of textile manufacturing and some experience in woolen and worsted piece and stock dyeing and color matching. Knowledge of finishing. Wishes to get into laboratory or dyehouse.

A-B-7

Education—Evening school in textile dyeing and chemistry.

Experience—Dyehouse laboratory for 2 years. Foreman dyer and finisher on hosiery for 9 years. Experience on ribbons also vat dyes on rayon and silk skeins. 2 years assistant to superintendent. Desires position either in demonstrating and sales or dyer. Age 31; married.

A-B-C-4

Education—Educated abroad.

Experience—Twenty years experience in the textile field as bleacher, dyer, finisher and chemist. 16 years in charge of dyestuff laboratory of large dyeing plant, 4 years as chief chemist with large bleachery. Has tested dyestuffs, and chemicals used in the textile field and has manufactured soaps and textile specialties. Has handled all textile fibers; bleaching, printing, dyeing and finishing same. Has done pigment and lacquer printing, waterproofing and fireproofing. Reason for leaving last position was due to business conditions.

Age 41; married.

A-B-C-5

Education—High school textile school graduate (textile school of Barman, Germany).

Experience—8 years skein and ribbon dyer; 2 years chemist-colorist laboratory work in Germany. 10 years boss dyer and superintendent for finishing in leading ribbon mill. German; American citizen; married; 40 years of age and willing to go anywhere.

A-B-C-6

Education—English Municipal School of Technology; Board of Education, So. Kensington Chemistry Certificates; City & Guilds of London Institute in Bleaching and Dyeing.

Experience—In U. S. A. 22 years as chemist and chief chemist with one of the largest textile plants in the country; expert colorist; long experience with permanent and semi-permanent finishes. Specialist on vats, naphthols and indigosols. Age 49; married.

A-B-C-7

Education—B.T.C., Lowell Textile Institute, member of honor society; speaks French fluently.

Experience—3 years as textile research chemist in charge of dye house and advisory to purchasing for large Canadian plant. Experienced in woolen and worsted yarn dyeing, for weaving and knitting; raw stock, top dyeing, piece goods dyeing and finishing. Laboratory practice in planning and checking methods and processes, costing and purchasing. 1 year experience as assistant dyer in top dyeing and print works. 1 year as chief chemist in cotton mill in charge of laboratory and control work of vatcolors, naphthols, sulfur and developed colors.

Married; age 28; references; American citizen; will go anywhere; desires opportunity to prove capacity.

A-B-C-F-1

Education—Textile institute course; extension work at Brown; executive training with Alexander Hamilton Institute; knowledge of German.

Experience—Dyeing executive in all types of textiles, including stock, yarns, and piece-goods. Thorough knowledge of all classes of dyes and dyestuffs, and their successful practical application in the plant. Wide experience in all types and makes of equipment used in dyeing, bleaching, mercerizing and finishing. Laboratory practice in planning and checking methods and processes, costing and purchasing. Good manager personnel for efficiency and satisfactory results economically obtained. Cotton, rayon and silk, some acetate rayon, and mixed fabrics. Age 46; excellent references; in excellent health.

A-B-C-F-2

Education—Lowell Textile Institute, 1911.

Experience—26 years in cotton yarn and piece goods finishing plants; expert on naphthols, vats and other cotton and rayon dyeing; all types of control work and testing; analytical processes; purchasing of dyes and chemicals. Age 46; excellent references; in perfect health; will go anywhere; married.

A-B-F-1

Education—Technical School. Dyeing and Chemistry.

Experience—Mill chemist. Dyer: yarns, tops and rawstock; wool, cotton and rayon. Vigoreaux printing. Bleaching. Would like position as dyer, chemist or demonstrator. Business conditions reason for leaving last position. Excellent references. Age 45.

B-3

Experience—Foreman piece dyer for the past 21 years. Can dye the following: rayon, cotton backs, wool, silk and mixed fabrics. Has knowledge of finishing and laboratory work.

B-4

Experience—Foreman dyer in charge of ribbon dyeing for 20 years. Experienced on silk, cotton, rayon, acetate yarn. Age 41; will go anywhere.

B-5

Education—High School and Textile School Graduate.

Experience—Twelve years overseer of dyeing on directs, vats, naphthols, sulfur, basic and developed colors. Also experienced bleacher. Age 40; married; references.

B-6

Education—Textile School Graduate.

Experience—Former instructor in chemistry and dyeing. Twelve years' experience as overseer of dyeing of vats, naphthols, developed, indigosols, sulfur and direct colors on piece goods. Age 35; excellent references.

B-7

Experience—Fourteen years' experience in the dyeing of woolen materials. Nine years as overseer of dyeing and five years as assistant dyer. Is thoroughly experienced in the dyeing of raw stock, tops, woolen and worsted skeins, woolen and worsted pieces, vistra piece goods, and union goods. Expert dyeing of shoddy pieces containing real silk specks. Bleaching of woolen and worsted skeins and pieces; also cotton pieces. Also capable of carbonizing pieces of raw stock.

34 years old; married.

B-8

Education—English Municipal School of Technology, Board of Education, So. Kensington; Chemistry Certificate, City & Guilds of London Institute in Bleaching, Dyeing and Printing.

Experience—In U. S. A. 15 years as assistant and colorist in large plants. Specialist on vats, Indigosols and naphthols.

B-C-1

Experience—20 years experience in dyeing and finishing departments; 15 months as general superintendent of well known woolen mill. Capable of handling dyeing alone or in combination as superintendent of dyeing and finishing.

Age 40; references.

B-C-2

Experience—12 years foreman piece dyer on vats (pigment), naphthols, soluble vats, sulfurs, developed, basics and directs. Pads, jigs, boxes and continuous machines. All constructions of cottons and rayons. Full practical knowledge of bleaching, mercerizing, and working knowledge of most finishes and finishing machinery. Could take charge of entire wet processing.

Age 38; married; references.

B-C-3

Education—Graduate, Philadelphia Textile School; speaks German fluently.

Experience—Employed at velvet company for 7½ years. Past 2 years working in finishing department on regular, waterproof and crush-resistant finishes (resin finishes). Can take charge of finishing of velvets. Have some piece dyeing experience.

29 years of age; married; will go anywhere.

B-D-1

Education—Received early training in England and attended technical college there.

Experience—Dyeing executive; all types of ladies and men's hosiery and all types of textiles including stock, yarns, piece goods and government uniforms; woolen and worsted suitings; cotton, silk and rayon on yarns, piece goods and mixed fabrics; thorough knowledge of all types of dyes, successful application of same and laboratory work. Fourteen years with one employer; business conditions, reason for unemployment.

Age 52; married; English American; sober and reliable. Desires position as dyer or demonstrator and service man for dye company.

F-1

Education—Two years high school; 6 years evening engineering school; 1 year evening textile school; 1 year industrial management; course in accounting.

Experience—Ten years in an executive capacity in full fashioned hosiery manufacturing business. Familiar with entire manufacturing procedure, finishing dept., dyehouse and office. Specialized in finishing dept. and has good eye for color, finish and quality. Had responsibility of all orders going through mill, stock, grey goods and traffic. Five months in New York sales office. Gets along well with people and contact with employees and customers has always been satisfactory. Previous to hosiery experience was in a mechanical business for 17 years.

43 years of age; single, in good health; will go anywhere.

COMING MEETING, SOUTHEASTERN SECTION

THE next meeting of the Southeastern Section will be held on Saturday evening, September 10, at the Officers' Club at Fort Benning, Ga., near Columbus, Ga. An excellent program has been arranged and an unprecedented attendance of members and visitors is anticipated.

A marked increase in the interest and membership has been experienced by this section during the past year. The membership enrollment now is approximately 150 compared with about 60 members a year ago.

The meeting in Columbus on September 10 will begin with an inspection tour of Fort Benning, which is one of the largest military reservations in the United States. Delegates will assemble at Memorial Stadium in Columbus promptly at 5:00 P.M. (Central Standard Time) and will be provided with military escort from that point on a tour of the military reservation. This special feature will be an added attraction for those attending the meeting.

At 7:00 o'clock the delegates will meet for dinner at the Officers' Club, following which the technical session will be held. The features of this part of the program will be an address on "The Dyeing and Processing of Rayon Staple Fiber," by W. G. Ware, Superintendent of Dyeing of the Mooresville, N. C., Cotton Mills; and an address on "The Importance of a Good Finish from the Sales or Executive Viewpoint," by Fuller E. Callaway, Jr., President, Callaway Mills, LaGrange, Ga., one of the outstanding southern textile mill organizations.

The officers of the section will report on progress made in plans for the national convention of the association in Atlanta on December 2-3. Members of other sections of the association are cordially invited to attend.

Annual Meeting and Convention

December 2 and 3, 1938

Atlanta, Ga.
Headquarters:
Atlanta-Biltmore Hotel

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LOUIS A. OLNEY, Sc.D.
Professor of Chemistry and Dyeing, Lowell Textile Institute
Directing Editor

NORMAN A. JOHNSON
Managing Editor

MYRON DREW REESER
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OUR NEW ENVELOPES

WHEN you received this copy of the REPORTER you no doubt noticed that we have discontinued use of the "wrapping paper" envelopes that have brought you your copies in the past. Appropriately enough for a journal which covers the dyeing field, we shall, starting with this issue, use colored envelopes for mailing. We are not confining ourselves to the use of just one color but shall use several.

In the future when you see a brightly colored envelope in your mail you will know at once that another copy of the REPORTER is being "Circulated Everywhere Textiles are Processed."

TRAINING AND OPPORTUNITY IN TEXTILES

THERE seems to be a fairly general tendency in almost any industry to think that the opportunity in some other industry would be better. Perhaps it would, but when we speak of textiles we are considering one of the very largest and most important industries. It employs an unusually large number of people who add an unusually large value during the manufacture of its products. Every man, woman and child in any civilized country must use some of these textile products. Their quantity and value is truly astounding.

Whatever may be true of any other industry, there will always be a great number of good opportunities in textiles. True, there are not a flock of new presidents and general managers appointed every day and, equally true, some of the big appointments may be assigned through influence or luck and not always go to those who seem to deserve them; but this is true of life in general, hence to some extent in all industries.

There are more independent producing units than in some other large industries and many independent sales units. Hence there are innumerable jobs (opportunities) for skilled workmen, sub-foremen, foremen, department heads, superintendents, salesmen, managers, and so on.

When we get down to an individual plant, or job, things frequently seem to be pretty tough but, viewing the whole broad field there is no end of opportunities, some just the same kinds as in all other industries, and others which are specialized.

The Textile Foundation has sponsored a study of textile education, which has pointed out more specific opportunities in textile management in applying methods and practices from other industries, which are apparently not fully utilized in textile production and marketing.

We shall have to leave it to the textile schools to shape their courses to fit any new needs that may have been brought out. Leaders in the textile business should, of course, study these new ideas, decide whether the broader findings fit the case and then decide what to do about it.

The schools will go on with their very useful work of training foremen, superintendents, and other specialists or executives. Will they also try to fill the broader need for greater vision and management? No doubt they will if given proper encouragement.

Obviously one way to acquire a real textile education would be to combine mill experience with the class room work. A scheme of this sort in electrical engineering is to be worked out at Carnegie Institute of Technology in Pittsburgh under an appropriation by the Westinghouse Electric and Manufacturing Company.

This company can easily hire any number of graduate engineers. Hence, although we can credit it with a desire to help Carnegie Tech, there must be something deeper behind the scheme. There will be fifty scholarships of which ten will be vacated each year at graduation, based on $200,000 increasing by $400,000 in 1946, added as an endowment. Each incumbent will take a four-year engineering course, and by working at the Westinghouse plant summers and for the equivalent of one school year, will also acquire two years of practical experience. At the end of this time Westinghouse will have found some, at least, of these men suitable for positions in the Company, and will be likely to have found a few exceptionally good men.

Perhaps this scheme does not parallel anything needed in the textile industry but it does show an unusual willingness of a large company to contribute to technical education. While education should no doubt be left mainly to the educators there can hardly be too much cooperation in working out the most useful courses or broader programs, nor too much financial aid from industry.

The textile industry certainly seems large enough to do more for its own specialized educational institutions.

Contributed Editorial.

WASHINGTON NEWS LETTER

WALDON FAWCETT

THE rule of gratitude for partial blessings may apply to the promise at Washington of relief for the forces of commerce and industry from the present statistical inquisition. Spokesmen for the Administration continue to insist that full rescue of science and business from excessive reportorial responsibilities must wait upon the reorganization of the executive branch of the Government. Obviously, that is true in respect to the simplification of Federal research by expedients such as the consolidation of conflicting or overlapping Divisions of Chemistry in the several Departments. But there is another side to Governmental interrogation where reforms are equally in order.

Statistical indigestion has been, for some years past, a chronic complaint, with mounting burdens laid upon creative and productive circles. Executives and technicians in every line have been swamped by continuous demands from the many and sundry government agencies for statistical and informative reports on every phase of private activity. Business has complained openly of the costliness of latter-day tax accounting. Even more serious for the victims, in point of interference with routine, has been the sequence of questionnaires, blanks, schedules and returns which has descended upon every manufacturing plant and laboratory, demanding, in all too many instances, detailed reports on matters outside the normal record-keeping range of the average institution.

From this mania of official curiosity there is a seeming chance of escape if the President follows up his summons to the Central Statistical Board to investigate the increase in governmental inquiries and submit recommendations looking to consolidations and changes. Expressing his concern, occasioned by the complaints reaching his office, the President desires to know the extent of the reportorial program and especially the extent of duplication.

THE CENTRAL STATISTICAL BOARD

The development above mentioned may be welcome if it does no more than give research and technical workers a closer acquaintance with one of the youngest of Federal institutions,—the Central Statistical Board. Starting modestly a few years ago, this clearing house received even less attention than it deserved because of the introductory announcement that the chief function of the Board would be the coordination of Federal statistics rather than a collection or compilation of statistical information. Now comes a turn of affairs which seems to hint that the Board may, in the performance of its governmental role, incidentally provide private industry with patterns for statistical selection and concentration.

One significant problem to which the Board is addressing itself is the need for coordination of statistical information on a world-wide as well as a national basis. The League of Nations has made a beginning in this direction. But with very modest minimum statistical standards. The leading nations, strange to say, are far apart in policies and practices. In England and France, which are far behind the United States in volume of statistical work, the statistical services are decentralized. In Germany, where the statistical services are highly developed, and in Canada, there is a considerable degree of centralization. Centralization has been carried still further in Russia. The Board has taken steps to bring about adherence by the United States to the International Convention on Economic Statistics.

Perhaps the most broadly practical undertaking upon which the new agency is already engaged is the program of inventories of research actually in progress. The idea is to progressively conduct inventories of statistical material available in fields in which many agencies are interested and in which needless duplication may result from lack of information by one agency cencerning work being done by another. A portion of this work will be in cooperation with the National Bureau of Economic Research. That the new project intimately contacts textile interests is indicated by the survey which the Central Statistical Board has recently carried out covering textile price series. Members of the Board's staff cooperated with four other Federal agencies in preparing a summary of the textile specifications for which wholesale price data are currently available.

WHAT PRICE TEXTILE EXPLORATION?

Not less than $25,000, in addition to present appropriations, would be needed if a Federal organization were to undertake studies on the development of improvements in cotton hosiery. This is the estimate given to Congressmen by Miss Ruth O'Brien, Chief of the Division of Textiles of the U. S. Bureau of Home Economics. It has been pointed out that the Home Economics organization has, in the past, made studies comparing the different qualities and grades of cotton when woven into fabrics.

Inaugurating a paralleled program, selected grades of cotton would be spun and knit into stockings and the serviceability of such stockings compared. Miss O'Brien claims that her unit needs to study methods of spinning and knitting which will give the necessary elasticity, improve the appearance of the hosiery, make it more attractive and, at the same time, as durable as the silk hosiery now on the market. She insists that there are great possibilities in this quarter provided stockings can be produced that are attractive, durable and not too heavy.

Quizzed by Members of Congress as to the specific investigative program she would undertake, the head of the Textile Division explained that she and her assistants could study the relationship between the cottons grown in this country and the quality of yarns that could be pro-

duced from them, together with their influence upon the quality of the knitted fabrics. Serviceability tests also are indicated to determine the relative quality of various cotton yarns of compared size when used instead of silk.

Off hand, the assumption was that the Washington bureau, if given this assignment, would have to provide additional equipment and bring in additional personnel as well as make cooperative arrangements for obtaining fibers of specific qualities spun and woven into stockings according to specifications. Then, there would follow the necessity for developing methods of testing both the yarns and the finished hose. Laboratory methods must be worked out, as well as serviceability tests. As an illustration of work already afoot, Miss O'Brien has cited to Congressmen the prospecting by the Durene Association in the field of sportwear. Her view is that so far only preliminary exploration has been carried out. She characterized the project as "up-hill work" because of the lack of facilities for experimental and research work.

MULTIPLE COLOR CERTIFICATION

New lengths in color certification will be reached if and when color certification in the cosmetic field becomes an accomplished fact. This is revealed by the preliminary investigation undertaken by the Toilet Goods Association in anticipation of the ultimate enactment of a consolidated Federal Food, Drug and Cosmetic Act. The present list of certified food colors will probably be exceeded several times over. Color diversification in the toilet goods field would, in any event, be extensive since the consumer acceptance of cosmetics is usually dependent upon color or shade. To accent this situation comes the present trend in the cosmetic field to a systematic response to fashion. The impulse of toilet goods makers to respond to every change of fashion means that the permitted list of certified cosmetic colors will needs be extensive at all times. And characterized by an elasticity that will permit additional colors to be added quickly when there is a shift of fashion.

The Board of Standards of the Toilet Goods Association, acting in cooperation with the color manufacturers, counts upon having an approved list of recommended colors ready for submission to the Federal regulatory promptly upon the signing of a cosmetic Act, whether in this Congress or a future Congress. The preliminary work is, at that, bound to be more or less time-consuming because color candidates selected by the Standards Board must then go before a Dermatological and Chemical Advisory Board. This latter body, composed of leading dermatologists with special experience in the field of color allergies, examines every color submitted and reports on the possibility of their toxicity and their action as skin sensitizing agents.

Evidence of a due desire to insure breadth of judgment in the color appraisals is supplied by the circumstance that the Color Committee of the Cosmetic Industry (with which the Board of Standards acts in concert) comprises seventeen members. Eleven color producers serve on the Committee of Color Manufacturers. And five specialists connected with public and private laboratories make up the Dermatological and Chemical Advisory Board. The moot questions at issue are, first, whether there shall be a net decrease or increase in the total of several hundred colors now in use in the cosmetic industry; and, second, what degree or proportion of sensitivity among consumers must be evidenced in order to bring about classification of a color as allergical.

RECOGNITION FOR ASSOCIATION-MARKS

Such is the present or prospective use of group-marks and collective trade marks in the textile field that there may be occasion for rejoicing in this quarter that Congress has at last made a move to supply a long-sought form of protection. Bills have been reported both in the U. S. Senate and the House of Representatives to make changes in the existing U. S. Trade Mark law which will admit to registration at Washington association-marks, industrial-community symbols, etc. If the Bills are approved a remedy will be provided for a state of affairs wherein protection against piracy has been available for foreign association marks in the United States and for our own export trade association marks (under the Webb—Pomerene Act) but legal shelter has been lacking for domestic association marks.

Confusion of status of collective marks in this country may be said to have started in 1911 in which year the United States, as a party to the International Convention for the Protection of Industrial Property, became obligated to register and protect trade marks belonging to associations even if the associations do not possess industrial or commercial establishments. Counting on the obligation of the United States under the International Convention, certain foreign associations, notably the French International Silk Committee, sought to obtain registrations at Washington for their marks. But the U. S. Commissioner of Patents, standing on a technicality, refused the desired registrations. Thereupon protests were lodged with the U. S. Department of State. With the result that in 1936 Congress passed an amendment granting registration for the collective mark of any association located in a foreign country and whose existence is not contrary to the law of such country.

This boon for alien collective marks left domestic association marks out in the cold. At the time the Bill making concession to foreign groups was pending it was proposed to expand it to include domestic associations. But the Commissioner of Patents objected that to thus broaden its scope might imperil the fate of the measure. So hundreds of trade and technical class associations have been left without defenses for their group-signatures. Not only here in the United States but in all foreign countries where registration and protection are dependent upon prior registration in the United States. The discrimination against domestic association marks would be ended by the Bill known as H. R. 9996.

NEW MOVE FOR UNIFORM STATE LAWS

The trend of policy in the National Association of State

Secretaries has rekindled hope in business and technical circles that this year may see a further advance of the revived movement for uniform State laws governing industry and science. Evidence constantly accumulates of the loss and inconvenience occasioned by lack of standardization of State statutes. One of the latest additions to this cumulation is found in the confusion in the field of Fair Trade legislation. Wide disparity exists as between the various State laws authorizing resale price maintenance. There are three distinct patterns followed by respective groups of the States. Added to which are individualistic versions evolved by lone States.

Entry of any fresh factor looking to agreement among the States on legislation affecting industrial property and the processes of commerce is the more welcome to executives because of their disappointment over the outcome of the earlier effort for all-States cooperation. Until a few years ago there was a general feeling of confidence that the National Conference of Commissioners on Uniform State Laws would be instrumental in furthering standardization of State laws. The program, worse luck, failed in various respects. For one thing, many of the Commissioners were unfamiliar with the legal aspects which business men feel are most in need of standardization. Equally serious in its consequences was the seeming sentiment among the Commisioners that there was no need to agree on "models" for certain types of laws (State trade mark laws, to name one among a number) which, to men engaged in commodity production and marketing, are most urgently in need of reconciliation, State by State.

TECHNICAL NOTES FROM FOREIGN SOURCES

Glass Filters and Colorimetric Standards

M. Roulleau—TIBA 15, 661 (1937). — A strictly scientific, closely reasoned study of the principles upon which exact analyses of the elements of a "color" depend. The paper is illustrated by four diagrams and one large table.

Contributions to the Theory of Acid Wool Dyeing

Dr. W. Ender and Dr. A. Mueller—Mell. Textil-Ber. 18, 732 and 809 (1937).—The first part of this paper has already been reviewed. The first of these two sections of the whole (parts II and III) deals in a detailed way with some exact determinations of pH values of the baths employed before and after dyeing, and of the same values before and after in reference to maximum absorption of the dyestuff acid. Two tables are included.

The second of these two sections (III of the whole series) (p. 809) describes still more experimental work, and discusses certain aspects of it. One table is included.

The authors summarize their work up to this point as follows; in dyeing wool with the ordinary, typical acid wool dyestuffs, in the pH range from strong acidity to weak alkalinity, the dyestuff is fixed upon the fiber by salt-formation between the basic groups of the wool and the acid groups of the dyestuff. As such a salt is only slightly hydrolyzable, the equivalence of the wool + dyestuff acid-salt is displaced so far in favor of the salt that the chemical union is possible even at pH values which lie considerably over the iso-electric point of wool. The more firm the combination (great fastness toward washing), the higher the pH values up to which the chemical combination of wool and dyestuff acid can take place, and so much the better the power of the dyestuff to dye wool from a neutral bath. Over the iso-electric point of wool, kathions are removed from the bath. As the pH value rises, the amount of dye-acid anions taken up by the wool diminishes, while the amount of kathions taken up increases. For each dyestuff there is a definite pH value, at which anions and kathions are taken up in equivalent ratios, so that the pH value of the bath will remain constant. This point can coincide with the iso-electric point of wool only when the unions of the protein with the anions as well as kathions are ideally reversible.

Protection of Wool by Eulans Against Moths and Anthrenus

Dr. Albrecht Hase—Mell. Textil-Ber. 18, 901 *and* 985 (1937).—The subtitle of this paper is "Results of 15 Years of Experience, from the Author's Own Experiments", and the author states, in the first paragraph, that it is intended especially for textile workers in wool in the broader sense.

The scope of the paper may perhaps be well illustrated by citing the titles of the different chapters, viz.:

1—the problem of protection of wool, considered biologically.

2—determination of damage and the estimation of value of methods of preparation and procedure. Under this heading the author lays down the following rules; that the woolen goods, after impregnation, must be permanently suitable for customary use, that the chemico-technical, desirable properties of the wool (spinning characteristics, luster, elasticity, dyeing properties, washing properties) must always remain within the workable limits of the customary processes, that the cost of the process of protection must be industrially bearable, that on the grounds of the users' health no possibility of danger from handling and wearing must exist, that the protection afforded to the goods must be a permanent one after a single protective treatment once for all, and that the goods shall not lose their protected state by ordinary use or by storage, that is, the protection afforded must last until the goods are worn out, and that, in the case of samples or goods of a historical nature, such as those preserved in museums, the protection afforded must be permanent in the absolute sense.

3—present results of experiments carried out in the past with different Eulans.

A—protection against moths,

a—after 15 years' storage, by Eulan F,

b—the same, after 7 years' storage, by Eulan New,
c—the same, after 5 years' storage, by Eulan NK, Eulan W extra, and Eulan New,
d—as c, after 4 years' storage,
e—protection after 3 years' storage, by Eulan AL and BL,
f—protection after 1 year's storage, by Eulan LW,
g—results of moth-proofing of weaves by Eulans, kept exposed in the open, after 15 months.

B—protection against Anthrenus.
h—general results with the Eulans,
i—results of protection of wool against Anthrenus by treatment with 4 per cent of Eulan NK and Eulan New,
j—the same, by Eulan AL, after storage for 4 years and 3 months,
k—conclusions.

The article is finely illustrated with 21 cuts, reproductions of photographs, most of them comprising several swatches in a single figure.

It is not surprising that the author highly commends the use of the Eulans. The photographs speak for themselves.

Quantitative Investigations Upon the Differential Absorptivity of Dyestuffs by Bleached Cotton and Rayons

Drathen, Hævekost, and Ruschweyh—Mell. Textil-Ber. 18, 915 (1937).—A paper dealing with the problem of uniform dyeing of goods containing more than one type of fiber (vegetable or of vegetable origin). The three types chosen for the study were bleached cotton, viscose-rayon, and Vistra, and six dyestuffs were examined, Brilliant Benzo Blue 6B, Oxamine Pure Blue 6BXX, Brilliant Benzo Blue 6B, Thiazine Red GXX, Oxamine Blue 3B, and Thiazine Red RXX, for which graphs are given for dyestuff absorbed (mg./concentration). It appears from the graphs that the nature of the dyestuff has a good deal to do with the result of the dyeing. As colloids, the dyestuffs would be differentiated by the magnitude of particle, the form of particle, the electrical charge (positive or negative), and the magnitude of charge. The degree of dispersion in the bath, conditioned by these factors, may be rightly estimated by determination of the degree of dispersion, determined by ultra-filtration, and by measurement of the rate of diffusion of the particles. Accordingly, a greatly dispersed dyestuff should be taken up to an equal degree by the three fibers. Of the dyestuffs mentioned, five were studied from this viewpoint, and ranged as follows:

Degree of Dispersion
1—Thiazine Red RXX
2—Thiazine Red GXX
3—Oxamine Pure Blue 6BXX
4—Oxamine Blue 3B
5—Benzo Pure Blue 6B,

the degree of dispersion being greatest with the first, and diminishing with the succeeding ones in order.

It is therefore possible to dye uniformly goods of the three fibers in question, provided a very finely dispersed dyestuff is employed.

The authors point out, however, that other factors, for example, temperature, must be taken into consideration; e.g., at higher bath-temperatures the dyestuffs go on more rapidly upon the artificial fibers, while a lower temperature and a longer time is more favorable for the cotton. It is not possible as yet to lay down any precise rules for such relations, and the dyer must at present rely upon observation, experience, and personal control. The authors, however, have shown that satisfactory dyeing is definitely possible.

Contributions to the Theory of Acid-Wool Dyeing

Dr. Alfred Mueller—Monats. f. Textil-Ind. 52, 216 (1937).—An abstract of an address delivered before the general meeting of the German Society of Dyers and the German Section of the International Society of Chemists and Colorists, at Frankfurt, in July, 1937.

This address was referred to in the preceding review of the paper by Dr. W. Ender on "The Mode of Reaction of Prechromed Dyestuffs Upon Wool."

Recent work has thrown much light upon the process of dyeing wool with acid dyestuffs. It is now known definitely that the free dyestuff acids which react with the wool in the dyebath are all very strong acids, and display an almost identical dissociation-constant of $K=10^{-1}$.

In the present study (see Dr. Ender's paper) the amount of free dye-acid taken up by the wool was determined gravimetrically, while the basic groups of the wool, still remaining uncombined, were determined by titration with dilute sulfuric acid. In all cases, the sum of the two values in reference to the normal acid-equivalent of wool was 0.085 g. equivalent/100 g. of dry (really dry) wool. The rate of absorption depends upon the temperature of the bath, the magnitude of the dyestuff-molecule, and the pH value. At room temperature the absorption is very slight, increases gradually with rise of temperature, and at about 90° C. it rises sharply with different dyestuffs. The molecular volume influences the rate of absorption in a way to be expected—the larger the molecule, the lower the rate of absorption, and, also, the better the fastness of the dyeing toward washing. Dyestuffs which are not so fast to washing generally dye level enough, and also are absorbed by the fiber more rapidly than some others. Too rash conclusions, however, should not be drawn from these statements, for there are other factors involved also—as the affinity of the dyestuff for wool, the related stability or instability of the dyestuff-acid wool compound, and the rate of diffusion of the dyestuff-acid in the wool and in water. The level-dyeing value of a given dyestuff does depend directly upon the affinity of the dyestuff-acid for wool; it can be altered by an alteration of the factors in the equation Wool plus Dye-acid = Dye-acid-Wool Salt. The limit of saturation of wool by mineral acids lies at

about pH = 1.3. By employing the dye-acids, the limit of saturation may be reached at a pH value of 2.5-3.0. That is, even above the isoelectric point of wool, a salt-formation between wool and dye-acid can take place. It should not be forgotten that, in practical dyeing, the Na-ions set free from the dyestuff, which are only in part neutralized by the acid groups of the wool, must affect the alkalinity or acidity of the bath, and so affect the fastness to washing of the resulting dyeings.

The Substantive Dyeing Process with Rayons

Dr. W. Weltzien — Monats. f. Textil-Ind. 52, 216 (1937).—It is now considered that the substantive dyestuffs are colloid electrolytes. As such, they display a rather high degree of dispersion in water which contains no salts in solution, but dye artificial fibers only slightly. A possible explanation of this fact may lie in the presence of differences in electrical potential in the dyestuff. Only the addition of electrolytes can bring the solution to a condition of neutrality, and so favor the aggregation of the dyestuff particles, these then beginning to be absorbed substantively. A distinction has to be drawn between the rate of absorption of dyestuff on the one hand, and the amount of dyestuff taken up, on the other, which is to be ascribed to the establishment of equilibrium in the solution. Even though the conditions of working are the same (apparently), there sets in a condition of saturation after a certain period (depending upon the nature of the dyestuff and of the fiber), which, with the same dyestuff, but with different kinds of fiber, will after a certain time again hardly make itself evident in noticeable differences of result. It must be kept in mind, however, that in scientific studies which have been made of the problem, the concentration of dyestuff has been kept constant through the whole process, a condition rarely met with in actual practice. The higher the concentration of salt (electrolyte), the greater the degree of aggregation of the particles of the dyestuff, and the lower the rate of absorption of the dyestuff. The amount of dyestuff taken up during the period of equilibrium, however, is increased by the addition of electrolytes. Alteration of temperature has a parallel effect; lowering the temperature has the same effect as addition of an electrolyte; increase of temperature as that of decreasing the concentration of electrolyte. A high temperature, then, favors the rate of absorption, but diminishes the total amount of dyestuff taken up.

All this assumes that the dyestuff is evenly distributed through the whole fiber. It has been assumed that a very high degree of dispersion is responsible for the even distribution of dyestuff, and that the diffusion of dyestuff in and through the fiber is subject to the same laws as diffusion in aqueous solutions. This view can no longer be maintained.

TRADE NOTES • NEW PRODUCTS

• DU PONT CHANGES

The following changes in the Organic Chemicals Department, Dyestuffs Division, E. I. du Pont de Nemours & Co., Inc., have been announced.

S. M. Conn, formerly district sales manager in Wilmington, has been transferred to the New York office as sales manager. G. E. Gillespie, formerly manager of the New York office, has been transferred to Wilmington as special assistant to A. R. Chantler.

• N. C. STATE COLLEGE

The Textile School of North Carolina State College will open its Fall session with the registration of Freshmen on September 9th. September 12th and 13th will be set aside for transfer students from other colleges to arrange their Fall term schedules, and registration will be completed on September 14th, when the upper classmen return.

Dr. Thomas Nelson, Dean of the Textile School, stated that the indications for the Textile School enrollment this Fall were encouraging.

The majority of the Textile students are from North Carolina, but other students are from states where textiles predominate. Applications have also been approved for students from Canada, Mexico, and China.

Since the close of the past school year considerable new equipment has been added and will be ready for operation this Fall. This includes Crompton & Knowles and Draper looms, dyeing equipment built especially for the Textile School by Smith, Drum & Company, also microscopes and testing apparatus.

• CORRECTION

In the item entitled "The Use of Salt to Prevent Heat Prostration" which appeared on page 477 of our August 22nd issue, the last sentence in the 5th paragraph should read:

"The relationship of this condition to a salt deficiency is not clearly established and it is thought to result from a vasomotor disturbance due to excessive dilatation of the superficial blood vessels. At any rate, even this condition appears to occur less frequently in those patients who have had an adequate salt intake."

• DU PONT RELEASES

Two new dyestuffs for use in the textile industry have been developed by E. I. du Pont de Nemours & Company:

"Pontamine" Fast Turquoise 8GL—a new direct color, primarily of interest for its brilliant, greenish blue shades, which are said to be more brilliant and much faster to light than those obtained with basic colors. It may be applied to cotton, viscose, rayon, silk, and wool as well as mixtures of these fibers.

"Ponsol" Blue GCL Paste—the latest anthraquinone vat color, in the du Pont range, which is said to be of special interest for bright, greenish blue shade on cotton and for its exceptional fastness to laundering with chlorine. It is noticeably greener and brighter in shade than "Ponsol" Blue 3G Paste but considerably redder than "Ponsol" Blue 5G Paste. It is said to possess good fastness to most color-destroying influences commonly encountered. It can be applied to all forms of cotton and viscose process rayon in all types of dyeing machines. Due to its physical properties, the color is also recommended for by the manufacturers for printing.

• CIBA RELEASES

The Ciba Co., Inc., representing the Society of Chemical Industry in Basle, have just released the following circulars and sample cards, illustrating new products of their manufacture and showing further applications of the older types:

Cibacete Blue GR.—This is a very productive blue for acetate rayons, which is said to exhibit exceptional exhausting ability. This property makes it available for the dyeing of deep shades, such as navy blues, dark browns and deep greens, without an appreciable waste of dyestuff. With Cibacete Blue GR pure blue tones may be dyed which are a trace greener than the well known Cibacete Sapphire Blue G. The dyeings are said to be noted for very good fastness to washing, water, perspiration and acids. The levelling property is good, so it may be combined with the best levelling types of the Cibacete series. In mixed fabrics, cotton and rayons are so slightly tinted that it may be safely used for dyeing such materials. Wool and silk are tinted, but may be cleared up considerably by an after-treatment with soap or Ultravon W. Cibacete Blue GR is not suited for printing, either as a direct print or as a discharge ground. Circular No. 481.

Diazo Brilliant Green G—(pat. applied for). When developed with Yellow Developer C, this new type gives a brilliant green and is well suited for dyeing cotton or viscose rayon in all stages of manufacture. The developed dyeings are said to be fast to washing, cross dyeing and perspiration. The fastness to light is sufficient for most purposes. Mixtures of cotton and viscose rayon are dyed uniformly, while acetate rayon remains reserved. Diazo Brilliant Green G is adapted for dyeing un-weighted silk from a weak acid bath. In mixed fabrics containing wool, the vegetable fibers are dyed a full shade at 140°F., while the wool is but slightly tinted; at a boil the wool is still a much lighter shade and may be brought up to shade with neutral dyeing acid dyestuffs prior to diazotizing and developing. Used as a ground shade on cotton or viscose rayon fabrics, Diazo Brilliant Green G may be discharged to a pure white, hence is of great interest for colored discharge prints. Circular No. 482.

Cibacete Sapphire Blue 4G.—Noted for its exceptional shade in artificial light, Cibacete Sapphire Blue 4 G is greener, purer and faster to light than the G and GF types. It is suitable for the dyeing of acetate rayon in all stages of manufacture and is of particular utility in making fashion shades in conjunction with Cibacete Yellow GN, GGR, Orange 3R, 4R, Red 3B, B, GGR. In mixed fabrics, cotton and viscose rayon are little tinted while wool and silk are stained and require an after-treatment with soap or Ultravon W for clearing. This new type is of no interest in printing. Circular No. 483.

Special Dyestuffs for Mixed Fabrics.—This card illustrates Union Colors, Union Fast Colors, Union Fast Chrome Colors as well as the same dyestuffs showing white acetate rayon reserves. Furthermore, the card shows Polytex Colors on wool, silk and cotton and the Polytex Fast Colors on wool, silk, cotton and viscose rayon. These classes of dyestuffs are said to be of particular interest in the dyeing of dress goods and in garment dyeing. They cover all the fibers in question in a one-bath dyeing, while the classes designated as Fast, give dyeings of greater fastness to light and water or washing. Sample Card No. 1595.

Fashion Shades on Combed Yarn from Worsted and Cut Staple, also from Wool with Viscose Effects.—This card shows the best suited Neolan, Acid, Cloth Fast and Union Fast Chrome Colors on this special yarn. For the production of delicate, fine fashion shades it is most advantageous to use colors which dye the wool and reserve the vegetable fibers. For the fuller tones, both fibers should be dyed, preferably with the Union Fast Chrome Colors. Sample Card No. 1601.

Dyeings on Mixed Yarn of Wool and Cisalfa.—This card illustrates suitable classes of dyestuffs adapted for the dyeing of yarn spun from a mixture of 50 parts Wool and 50 parts Cisalfa. About a dozen shades each of the following dyestuff classes are shown: Union Colors, Union Fast Colors, Polytex Fast Colors, Union Fast Chrome Colors and Diazo Colors combined with neutral dyeing Cloth Fast Colors in a one-bath dyeing process. Sample Card No. 1602.

Neolan Colors on Carpet Yarns.—There are 142 dyeings of the Neolan types and popular shades. The carpet industry demands many rich shades and for the better classes of rugs and carpets there must be also a very good fastness to light as well as resistance to all forms of wet treatments, such as ammonia wash, Oriental chlorine wash, casual stains, etc. The Neolan Colors are said to fulfill all the requirements and are used extensively for dyeing carpets for use in steamships, railroads, theaters. Their easy levelling and penetration also adds to their popularity. Sample Card No. 1600.

Chlorantine Fast Colors. — Fashion shades on cotton goods. The dyeings are on cotton repp, care has been taken to show a very comprehensive line of the most popular shades made with the fastest possible combinations. Sample Card No. 1605.

Neolan Colors—Fashion shades fast to light and wear. The dyeings have been made on wool gabardine and are made from types having the best fastness to light, water, washing, perspiration, stains, etc. The types featured are Neolan Yellow 8GE, BE, Reds GRE, BRE, Pink BA, Blues 2R, GG, while for the deeper tones are used Brown GG, Navy Blue 2RL conc., Dark Green B and Black SR conc. All the types shown are also noted for their levelling and penetrating qualities. Sample Card No. 1610.

Chlorantine Fast Diazo and Sulphur Colors on Cisalfa.—64 dyeings on the loose fiber are shown, the various types of colors being dyed in their usual manner. This card will be found of great interest as this foreign type of cut staple fiber gains headway in America. Sample Card No. 1616.

Ciba and Cibanone Vat Dyes.—Micro powders in printing. Showing 18 dyestuffs in two depths. The advantages of the micro powders over the paste forms is described and illustrated, it being pointed out that a higher degree of dispersion is possible with the powder, while there is no danger of drying out or freezing during storage. Sample Card No. 1622.

● GENERAL RELEASES

General Dyestuff Corp., 435 Hudson Street, New York City, announces release of circulars describing the following product:

Acid Anthracene Brown LE—a new chrome brown which may be used either chrometopped, on a chrome mordant or according to the chromate method. It dyes reddish brown shades which are said to be distinguished by their particularly good fastness to light; the product, in this respect, is claimed to be superior to any other chrome brown. It is further claimed that the fastness to milling is very good, and to carbonizing, potting and decatizing good. It is also said to possess very good fastness to water, washing, salt water, perspiration and alkali. The shade turns only slightly redder under artificial light. Circular I.G. 1520.

Peregal O—a new edition describing the characteristics of this product but further gives the results of additional practical trials carried out since this product was first placed on the market. As is probably well known by this time, Peregal O is extremely useful both as a levelling assistant and a stripping agent for vat dyestuffs on both yarn and piecegoods. It is furthermore very valuable as a dyeing assistant for direct and basic dyestuffs. Booklet I.G. 1431.

● MANAGEMENT CONGRESS

Prominent members of the chemical and allied industries are aiding in the preparation of the program for the Seventh International Management Congress, the first to be held in America, at Washington, D. C., from September 19 to 23.

Industrial leaders and management authorities from some 40 countries will exchange information on the solution of industrial problems and dramatize before

a wide public what management is doing and planning in the interests of social and economic progress. About 2,000 Americans and some 300 from other countries are expected to attend.

Representatives of chemical and allied interests serving on the advisory council of the coming Congress are: William B. Bell, president, American Cyanamid Company; F. A. Countway, president, Lever Brothers Company; and Robert L. Lund, executive vice-president, Lambert Pharmacal Company.

The Congress technical papers have been printed for distribution before the opening of the sessions and will serve as discussion stimulants. Among those contributing and their subjects are: I. J. Berni, office manager, Procter & Gamble Company, "Maintaining a Responsive Office Staff"; and Dr. H. C. Sherman, chemistry department, Columbia University, "Human Nutrition."

At the general sessions R. Lloyd Roberts, chief labor officer, Imperial Chemical Industries, Ltd., London, will speak on "The Machinery for Industrial Conciliation and Arbitration in Great Britain," and A. Basch, general manager, United Chemical and Metallurgical Works, Prague, Czechoslovakia, will speak on "The Continuance of Free Enterprise."

The Right Honorable Viscount Leverhulme, governor of Lever Brothers, Ltd., is president of the International Committee of Scientific Management, sponsoring group for the Congress. The American Affiliate of the International Committee is the National Management Council.

Active promotion in the United States of the Congress is being carried on by a co-ordinating committee headed by William L. Batt, president of S. K. F. Industries, Inc. One of the vice-chairmen is William H. Gesell, executive vice-president, Lehn & Fink Products Corporation.

Twelve men in the chemical and metallurgical field are serving on committees in preparation of the five-day program. They are: Lee H. Bristol, vice-president, Bristol-Myers Company, Inc.; Allan Brown, Bakelite Corporation; Oliver F. Benz and Frank C. Evans, E. I. du Pont de Nemours & Company; S. Bayard Colgate, chairman, Colgate-Palmolive-Peet Corp.; Crosby Field, Flakice Corp.; Leslie S. Gillette, United States Industrial Alcohol Company; Thomas D. Jolly, Aluminum Corporation of America; R. D. Keim, vice-president, E. R. Squibb & Sons; Sam A. Lewisohn, vice-president, Miami Copper Company; R. S. Uhrbrock, research department, industrial relations division, Procter & Gamble Co.; and W. H. Winans, Union Carbide & Carbon Corporation.

Four organized tours, on which inspection visits will be made to internationally known concerns, will be available to Congress members. Charles H. Hatch, assistant to the president, National Can Corporation, is chairman of the committee in charge.

The Congress is made possible through the generous financial support of corporations, associations, and individuals, among whom are listed the following: Allis-Chalmers Manufacturing Company, Atlas Powder Co., Bristol-Myers Co., Inc., Celluloid Corp.; International Nickel Company, Kennecott Copper Corp.; St. Joseph Lead Company, Vicks Chemical Company, Texas Gulf Sulphur Company, Mathieson Alkali Works, and Charles Pfizer & Company, Inc.

Early registrations for the Congress sessions have come from chemical and metallurgical executives, including Carle M. Bigelow, Calco Chemical Company, Charles J. Brand, National Fertilizer Association, and Roscoe C. Edlund, Association of American Soap and Glycerine Producers.

Among those attending from Lever Brothers and Unilever, Ltd., England, in addition to Lord Leverhulme, are Col. E. Briggs, chairman of Port Sunlight, Ltd.; H. H. Longman, and J. F. McCartney, staff controller. Also from abroad is M. Woosnam, Imperial Chemical Industries, Ltd.

World Congresses have previously been held in Prague, Brussels, Rome, Paris, Amsterdam, and London. In all probability the Congress will not come to the United States again for more than a generation. Information and registration forms may be obtained from Nathaniel W. Barnes, executive secretary, 347 Madison Avenue, New York, N. Y.

CLASSIFIED

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

POSITION WANTED: Finishing plant chemist desires responsible position. Expert on vats, napthols and other cotton and rayon dyeing. All types of control work and testing. 26 years' experience on yarn and piece goods. Write Box No. 993, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

POSITION WANTED: Twenty-five years' experience in leading Dyeing and Finishing Plants as a Boss-Dyer and Superintendent, responsible for cost, quality and production, on Silk, Weighted Silk, Rayon, Acetate, Spun Rayon and all mixed fibers. Also practical experience in demonstration. Early training, theoretical and practical in Switzerland, Italy, France and Austria. Good contacts with leading Finishing Plants in New England and New Jersey. American Citizen. Willing to take position as Boss-Dyer, Supervisor or Demonstrator with rated concern. Excellent references. No objection to location. White Box No. 144, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

CAPABLE CHEMIST WANTED: Young, aggressive, growing concern located in East has unusual opening for wide awake, well trained, accurate chemist between ages 25 and 35. Must have had industrial experience in both routine and development work in textile or allied fields. Opening is with company in specialty detergent field with unusual opportunity for a man who can qualify. State all qualifications, degrees, experience, enclose photograph and address application in own handwriting to Box No. 145, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

POSITION WANTED: Plant-chemist, technician desires position with dyeing or printing organization. Can take charge or supervise the processing of rayon, acetate, spun rayon and cotton fabrics, also lastex corsets and swim suitings. Can supervise laboratory control and research, economy in dyeing and finishing. 14 years of practical experience with leading organizations. Write Box No. 146, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.